

*Presenting the:*

**1998 NDIA -**

**3rd Annual**

**Technology and Management Conference**

*November 2-5, 1998*

19990126 012

*Primary Base Operations Conference:  
Challenges for the Government and Industry Team"*

*November 2 - 5, 1998*

*Marriott Bay Point Resort & Conference Center*

*Panama City, Florida*

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## Table Of Contents

### Monday, 2 Nov.

LtGen. John Rhodes, USMC Monday Dinner Speaker .....	5
--	---

### Tuesday, 3 Nov.

RADM Kenneth E. Barbor, USN Tuesday Lunch Speaker .....	18
CDR Paul Bienhoff, USN "Organic Subsurface MCM, SSMCM Programs" .....	48
RADM Dennis Conley, USN and CAPT Buzz Broughton, USN "Concepts & Vision, Dedicated and Organic MCM" .....	72
Mr. Dan Crute "Shallow Water and Surf Zone Breaching Programs" .....	91
LtCol. James Derdyn, USMC "Emerging Amphibious Concepts" .....	107
Mr. Dale Gerry, ASN "Mine Warfare" .....	136
RADM William Marshall, USN and CDR Steven Lehr, USN "Fleet Engagement Strategy: Mainstream Mine Warfare" .....	160
CAPT Tim Schnoor, USN and Mr. Walt Rankin "Joint Countermine ACTD Demo II Results" .....	188

### Wednesday, 4 Nov.

MajGen. Lawrence Arnold, USAF Joint Expeditionary Warfare Session Panel.....	201
Col. Dan Bourgoine, USA Joint Expeditionary Warfare Session Panel.....	231
RADM Dave Brewer, USN "Future Concepts and Exercise Kernel Blitz 97" .....	241
RADM James Hull, USCG Joint Expeditionary Warfare Session Panel.....	249
CAPT Bill Luebke, USN "LPD 17 Program" .....	273

RADM David Sargent, USN "Amphibious Ship Programs" .....	297
CAPT John Strott, USN "Amphibious Warfare Programs" .....	331

**Thursady, 5 Nov.**

RADM John Nathman, USN Platform Sponsors Panel.....	368
CAPT Ray Pilcher, USN "Surface Warfare Perspective Plans & Challenges" .....	384
CDR Jon Sharpe, USN "Land Attack Destroyer (DD21) Perspective" .....	404
Col. Lynn Stuart, USMC "Marine Fires for the 21st Century" .....	425
MajGen. Patrick Howard, USMC " LAW, A Critical Element of OMFTS.....	442
Naval Surface Fire Support "NSFS Program Perspective, Progress and Plans" .....	448

Draft Remarks by  
Lieutenant General John E. Rhodes, USMC  
Commanding General, Marine Corps Combat Development Command  
Before the  
National Defense Industrial Association  
Nov. 2, 1998

It's a great pleasure to have the chance to talk to you. I have been asked to talk tonight about the many challenges and opportunities of 21st Century Expeditionary Warfare. You could not have picked a topic that is more timely or more relevant to our Nation's needs.

I don't know if everyone here has seen the recent movie, *Saving Private Ryan*. The director, Steven Spielberg, has produced a powerful movie that captures the fear, chaos, and lethality of modern war better than any other movie or book can in our day. How the hero, Captain Miller, and his Rangers face up to the sheer terror and horror of the landing at Omaha Beach is an enduring lesson on the human dimension of war, the importance of unit cohesion, and the critically of adaptive leaders. It generates, in a powerfully graphic manner, a theme that I want to talk about this evening.

The opening scene sets up Spielberg's theme. The movie begins, and ends, with a much older Private Ryan revisiting the military cemetery in Normandy. He's an old man now looking back on his service and the way he has lived his life since his teenaged terror. This older Private Ryan represents an entire generation

of Americans. This is the generation that won World War II. It is a generation that we owe much to, and one that has left us with a challenge.

Spielberg presents this very simply at the conclusion of the fierce urban fight. It is this challenge that makes *Saving Private Ryan* so poignant and so relevant to this audience tonight. As Captain Miller lay dying, he pulls Ryan close and whispers, "Earn this."

The same challenge is before us again. Our challenge today is to "Earn This." We have to continue to earn the special trust and confidence that our fellow Americans have in us. We have to maintain the same standards of physical and moral courage, and the same unwavering commitment to professional excellence. To fail to do so is to fail those who stormed ashore at Omaha, as well as at Tarawa and Okinawa.

But to "earn this" means more than just living a moral and honorable life. To us in the expeditionary warfare business, it has a broader meaning. Each generation, as part of its challenge to "earn this," must continue to extend the art and science of warfare in its age. It must preserve its core competencies but also adapt to change. It must continue to be aware of what my boss, General Krulak, calls "strategic inflection points," those times when either new strategic challenges or technological opportunities present sharply new operational approaches. Our

predecessors in the 1930's achieved this by developing the tactics, techniques and procedures that enabled the development of amphibious warfare into the science it became during the Second World War. Today's expeditionary warriors must extend this legacy.

Its not too soon to start thinking about this future. Both the Department's own Quadrennial Defense Review (QDR) and the complementary National Defense Panel (NDP) share this view. The QDR acknowledged that our conventional military dominance will drive future adversaries to use asymmetric responses to attack our forces and interests overseas--specifically to delay or deny U.S. access to critical regions and facilities.

The NDP also stressed that "the cornerstone of America's continued military preeminence" is our ability to project combat power rapidly and virtually unimpeded to widespread areas of the globe. This cornerstone is dependent on our capacity to gain and sustain access to critical regions far from our shores. As both reports underscore, a combination of adaptive enemies, emerging technologies, coalition political conditions, and geographic realities are creating greater challenges to U.S. power projection forces. This challenge is most evident in the littoral regions of the world. Clearly, the littoral regions represent *where* we will fight. It is now home to 75 percent of the world's population and eighty percent of



the world's capitals. It is the intersection for the vast majority of the world's commercial traffic and economic activity.

But it is not enough to know *where* we must be prepared. Another aspect of the strategic environment is anticipating *how* we will fight, and how future opponents might seek to oppose us. The new operational concepts and resulting programs we have put in place since *Forward...From the Sea* was first promulgated in 1994 represent just the sort of new approaches and new thinking needed in tomorrow's chaos-filled littorals. These concepts have been carefully formulated to ensure we retain the ability to project powerful naval expeditionary forces to *shape* regional environments, *respond* decisively to crises ranging from humanitarian assistance relief to major conflicts, and, at the same time, enable us to prepare for the future.

Creating new operational concepts and developing innovative force designs are essential to Marine Corps success in the 21st Century. Operational concepts are the "engine of change" for transforming the Corps. These concepts guide us towards the future and are the basis for selecting an initial course of change.

Our major concepts, including Operational Maneuver from the Sea, Ship to Objective Maneuver, and Sustained Operations Ashore, have all been developed in response to new strategic and operational conditions that must be mastered if

we are to successfully pursue U.S. global interests. OMFTS capitalizes on naval forces' ability to use the sea as a maneuver space and is the Marine Corps capstone operational warfighting concept for the 21st Century. It is applicable across the full range of military operations, and it places unprecedented emphasis on the littorals and demands cohesiveness between naval forces.

Through wargaming and experimentation we identify and exploit the more promising concepts and supporting technologies for subsequent assessment. The Marine Corps Warfighting Laboratory serves as the focal point for operational reform as it experiments new and promising concepts and technologies, and assesses their impact on the Corps warfighting capability. Finally, the Marine Corps Combat Development System, for which I am responsible, translates validated operational concepts into warfighting requirements that are resourced to achieve an integrated warfighting capability.

Several key naval programs, most at the cutting edge of technology, are required to bring the OMFTS concept to fruition. These include the major Marine programs such as the MV-22 Osprey and the Advanced Amphibious Assault Vehicle (AAAV). They enhance decisive responses by forward deployed forces to events ranging from presence to conflict resolution.

However, success in the littorals is not just a Marine requirement. The Marine Corps cannot go it alone. We have to work hand in glove with the other half of the Navy/Marine Corps team to fully exploit our concepts and to fully satisfy the expectations of our Nation's leadership. The Navy Operational Concept (NOC), published in March of 1997, articulates the Chief of Naval Operation's vision for driving the ongoing process of innovation and adaptation in littoral warfare. The NOC sets forth a high standard for our sister Service--- the "ability to dominate the littoral, including the undersea environment," which will allow "us to operate with impunity in the face of enemy area denial threats."

Turning the NOC and OMFTS into realities vice conceptual documents requires a focused effort and carefully crafted naval shipbuilding program. Being able to "operate with impunity" in the demanding operational context we have defined as "chaos in the littorals" can only be accomplished with serious investments in expeditionary warfare mission areas. Projecting power globally into the littorals necessitates naval support programs for amphibious lift, maritime prepositioning, mine warfare and naval surface fire support, as well as C4 ashore.

Naval expeditionary forces, with embarked Marines, meet the critical need for maritime forward presence and crisis-response forces for employment in support of U.S. national interests. These forces provide the most formidable

amphibious forcible entry capability in the world, enhanced by unparalleled strategic and operational flexibility. With such expeditionary forces, our Nation's senior leaders have deployment and employment options suitable to a wide range of missions. They can adjust the power projection "rheostat" as precisely as needed with tailored, crisis response forces that are applicable across the conflict spectrum.

But providing this rheostatic capability around the world requires sufficient amphibious lift. We will have a shortage of available lift until ships of the *San Antonio* (LPD 17) class are commissioned into service. The big deck amphibious ships (LHA/LHD/LPH) are the heart of every ARG, and currently 11 ships are in the inventory. The current program will bring the number of big decks to twelve. Careful investment in the amphibious ship building program is required. Naval expeditionary forces require that twelfth big deck to support forward presence, and the current program will meet that objective.

The Maritime Prepositioning Force (MPF) is a key element of the Marine Corps expeditionary capability, providing the rapid deployment of expeditionary forces practically anywhere in the world through the link-up of operating forces with prepositioned equipment and supplies. The three current Maritime Prepositioning Ship (MPS) squadrons, composed of thirteen ships, provide our

Nation a unique geostrategically prepositioned capability. Employment of MPS assets during **Desert Shield/Desert Storm** and **Vigilant Sentinel** against Iraq, and in **Restore Hope** and **Continue Hope** in Somalia, clearly demonstrated their utility for a range of military operations from general combat to disaster relief and humanitarian assistance.

Let me talk for a moment about MPF in the context of **sustainment** to our forward deployed forces. Key to all our warfighting concepts is the idea of seabased sustainment. In the future, combat service support will remain seabased to the greatest extent practicable. Seabasing reduces over-the-beach logistics requirements and eliminates lucrative "rear area" targets, thereby enhancing overall freedom of action and force protection.

We recognize that some combat service support will likely be required ashore to support maneuver elements, but we think that such support will be provided by highly mobile direct support elements rather than traditional fixed sites. We are moving in the right direction with our new *MPF 2010 and Beyond* concept, which describes how next-generation maritime prepositioning forces will contribute to forward presence and power projection.

Our emerging operational concepts place greater emphasis on the range and speed of the LCAC than first envisioned in the 1980's. OMFTS and STOM are



predicated on minimizing our logistics footprint ashore and reducing our reliance on vulnerable ports and "iron mountains" of supplies that can be easily targeted by our opponents. Quite frankly, the LCAC is the linchpin of OMFTS for providing seabased logistics support to our maneuver forces ashore. Nearly all of the ground combat and combat service support assets will come over the horizon via LCAC. Expanding the SLEP program to enhance the LCAC's operational range and capabilities is a critical issue we have strongly underscored. Moreover, we need to take a hard look at developing a family of improved, fast lighterage to replace our dwindling fleet of aged landing craft.

Mine warfare is an essential warfare capability and is certainly integral to the ability of naval forces to effectively operate in the littoral battlespace. However, this is a warfare area that is frequently overlooked in peacetime. It is one of our greatest threats--a potential "show stopper"--because mines represent a low cost, high leverage, anti-access option to many future antagonists. It is more than likely that the presence of mines will arise in a future crisis. It has been estimated that the world inventory of mines has doubled since 1991. It is time for the United States to ensure that mines do not have a profound impact on our ability to dominate the littoral battlespace. The recent emphasis on funding in this area is heartening.

Today, a considerable array of modern systems are being developed for mine countermeasure (MCM) forces. The focus is on providing naval expeditionary forces with an organic mine countermeasures capability to ensure the unencumbered maneuver of forces in any littoral scenario. By outfitting organic MCM capabilities on surface ships and submarines, our "first to fight" forces will be able to operate successfully in the littorals.

Focused S&T and developmental efforts to detect, clear, and neutralize the mine threat will allow us to maximize our ability to penetrate and operate in the littorals against this threat.

OMFTS places increasing demands on Naval Surface Fire Support (NSFS). Sea-based fire support will be required to support joint forces and must be able to integrate all fires with maneuver forces over a more extended battlespace. NSFS must provide various types of fires and levels of responsiveness. Near and mid-term initiatives to meet NSFS requirements include improving existing guns and developing an extended range guided munitions (ERGM) and a rapid response land attack missile.

The modification of the current shipboard 5-inch/54 caliber gun mount, in conjunction with the development of the Extended Range Guided Munition (ERGM), moves us towards the near-term NSFS mission need. The Navy's

program ensures that a total of 22 cruisers and 27 destroyers will be modified over the next decade. This effort offers a level of range and accuracy never before seen in a sea-based fire support system. We are especially encouraged by the interest shown in the surface warfare community in innovative approaches to fire support and the support for land attack in the DD-21 program office.

These improvements will enable NSFS to effectively support OMFTS operations and give the MAGTF commander the requisite support essential for executing his missions. These enhancements will provide a critical boost to naval littoral capabilities and result in extended, more accurate and more lethal fire support to maneuver forces ashore. As Admiral Johnson recently stressed in an article entitled *Anytime, Anywhere: A Navy for the 21st Century*, the Navy's purpose and focus has shifted to "influence directly and decisively events ashore." The NSFS program is a key component of this focus.

Both the strategic and operational environment in the 21st Century will be one of complexity and continuous change. Chaos in the littorals brings both new opportunities and new challenges to the Navy/Marine Corps team, a team that has traditionally worked together to solve problems by developing creative solutions. We are continuing that tradition today, actively moving forward *preparing now* for whatever the future brings. At the same time, we are providing the *shaping*

and *responding* capabilities that the QDR called for with "flexible and multi-mission" forces able to respond across the entire conflict spectrum.

I happen to think that we are approaching an age where naval expeditionary forces will remain the nation's primary response force. The key to this will always be our forward deployed posture and our expeditionary orientation.

The expeditionary business is quite a growth industry these days, it seems as though everyone wants to be "expeditionary." However, those of us in the expeditionary business realize just how hard a market it is. There are high barriers and higher standards to get to this playing field, and you don't buy a ticket for this contest with mere rhetoric or press releases. Being expeditionary is more than what you call yourself. When you get right down to it, its a mindset and a complete orientation on how you prepare for war. If you are really expeditionary, it shows up in how you design your force structure, what kind of equipment you buy, how you construct your logistics system, how you craft your aviation forces to operate off of ships, patches of asphalt or just plain dirt. It is reflected in your doctrine and in your training exercises. It is how you think about everything you do!

Expeditionary warfare is, of all things, a mindset and a mental approach. It demands flexibility and improvisation. Referring back to the movie *Saving*

*Private Ryan*, I love the scene where Tom Hanks uses a little shaving mirror and some bubble gum to look around a dangerous corner to find some dead space for his unit. You could also see the same adaptability in the desperate defense of that bridgehead when Hanks taught his embattled team how to make "sticky bombs" to immobilize a Tiger tank. That's what I mean about adaptability--the ability to make do with what you have in hand to get the job done. Captain Miller had what it takes to be an expeditionary warrior. That same mindset, the same flexibility, the same indomitable willingness to get the job done exists in today's generation, and has to be passed on to the next.

So that is our challenge today--to "earn this." All that we are and all that this uniform represents is based on many PFC Ryans and Captain Millers. Our Ryans and Millers sweated on Edson's Ridge, they shared a common hell on Iwo Jima, and huddled together to keep warm in the Chosin. They faced their own close quarter fights in Hue and in Beirut. They were the first to lead our forces through the "line of death" minefield in Kuwait. If you keep these thoughts in mind, your life and your efforts--especially your efforts in expeditionary warfare--will have answered our Nation's call and the challenge to all the future Private Ryans. You will have "earned this." God bless you and thank you.





**Presentation for**

# **Expeditionary Warfare Conference**

**3 November 1998**

**RADM Kenneth E. Barbor, USN**

**"Understanding the oceans is fundamental to our national security, as well as to global economic and environmental well-being. A robust competency in oceanography is a core requirement and responsibility of the U.S. Navy. It is so vital to the success of naval operations that the Navy must lead in focussing attention on ocean policy and programs."**

**Admiral Jay Johnson**  
**Chief of Naval Operations**



Global responsibility to provide operational meteorological, oceanographic (METOC), and mapping, charting and geodetic services to the operating forces of the Navy and the Department of Defense.

*From the top of the  
atmosphere . . .*





*"Any time . . .  
Anywhere"*



COMNAVMETOCOM

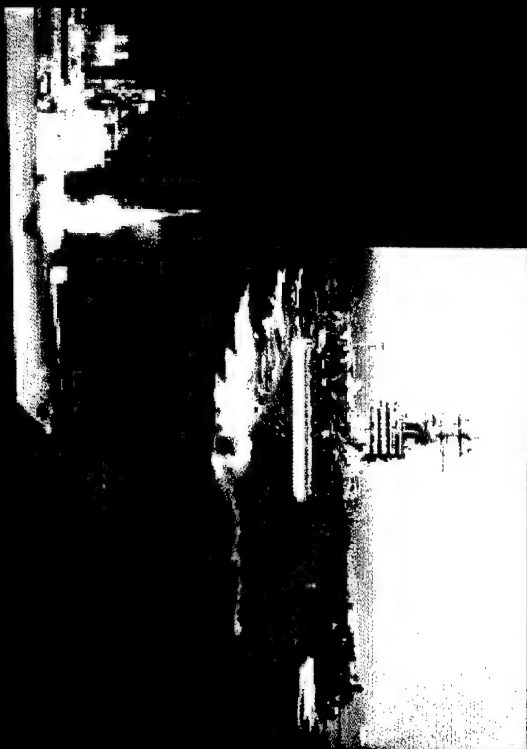


# Commander, Naval Meteorology and Oceanography Command

2 Primary Production Centers	 8 Oceanographic Ships
▲ 4 METOC Regional Centers	● 36 Detachments
1 Special Center	 7 Mobile Env. Teams
5 Facilities	23 HYCOOP Program Countries

# Three Mission Areas

- Safety of the Fleet/Navy shore establishment

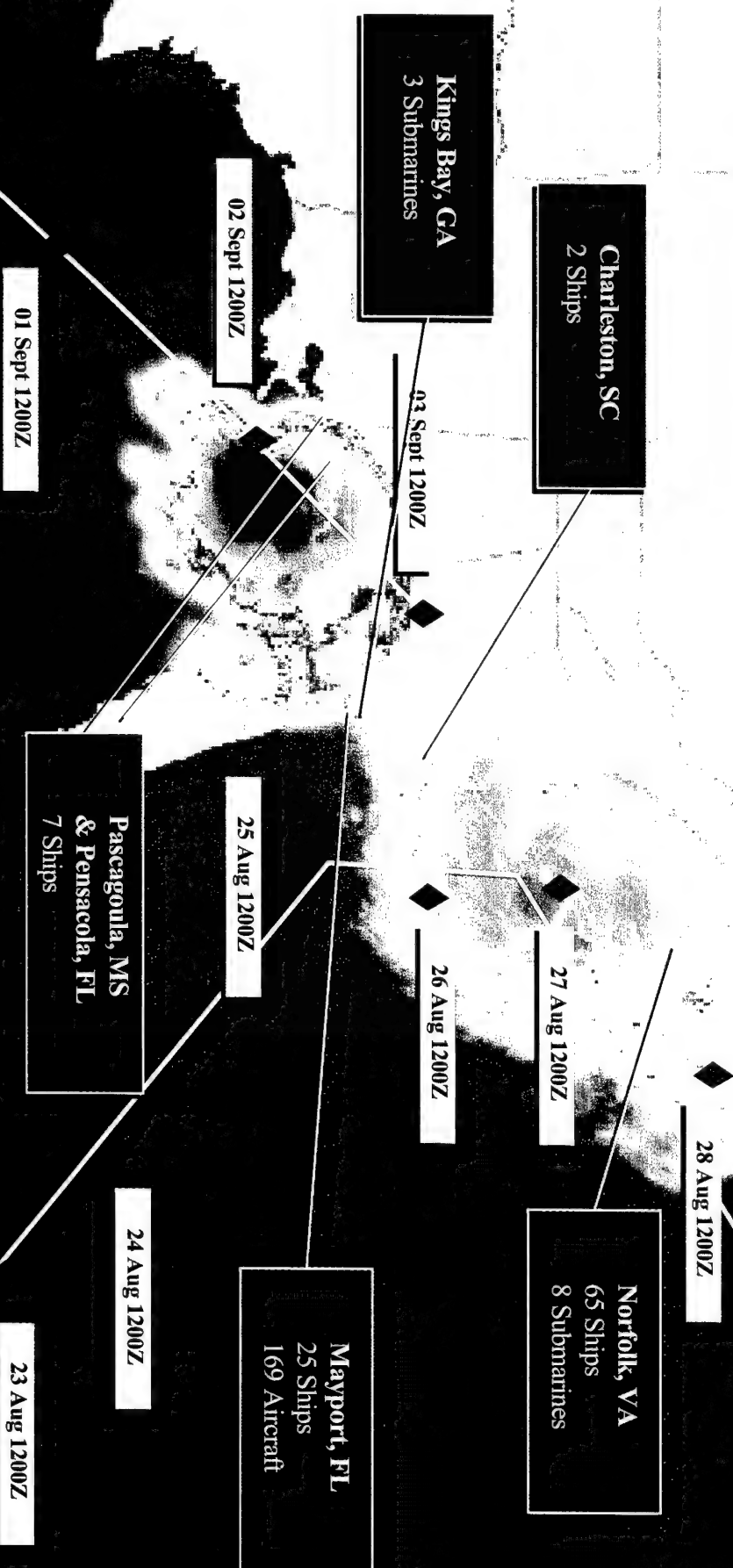


**COMNAVMETOCCOM**



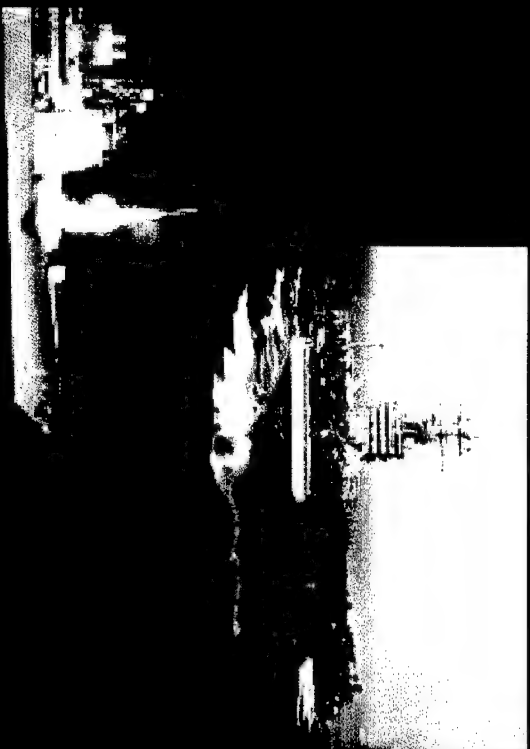
# Safety of the Fleet and Navy Shore Establishment

## Hurricanes Bonnie & Earl Ship and Aircraft Sorties



# Three Mission Areas

- Safety of the Fleet/Navy shore establishment
- Assess & predict the impact of the environment on Navy platforms, weapons systems and sensors



## COMNAVMETOCCOM

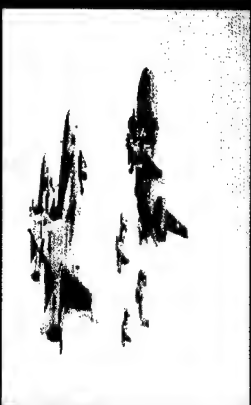


High Resolution  
altimetry Data

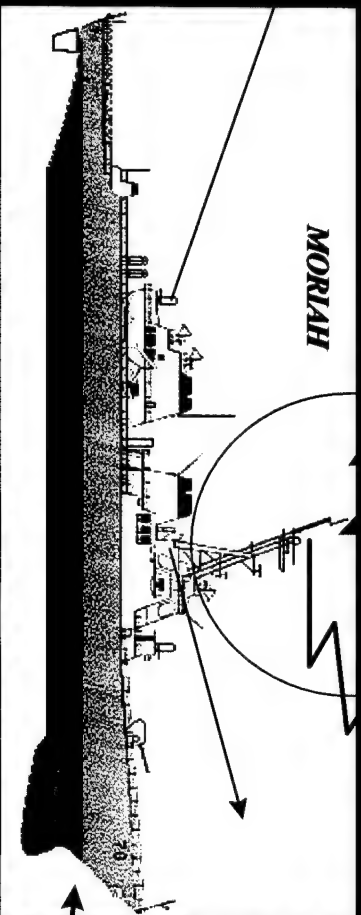
# Assess & Predict the Impact of the Environment on Navy platforms, weapons systems and sensors



Radar/Comms  
Effectiveness



Oceanographic &  
Bathymetric Data

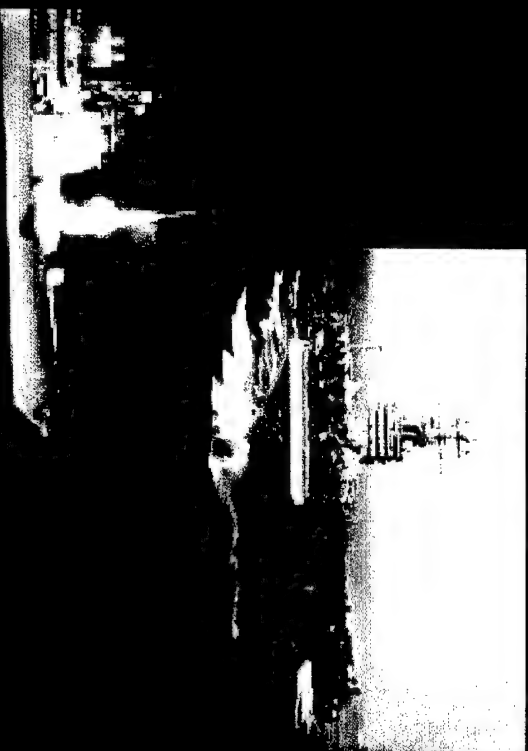


Model Proploss



# Three Mission Areas

- Safety of the Fleet/Navy shore establishment
- Assess & predict the impact of the environment on Navy platforms, weapons systems and sensors
- Integrate Environmental Considerations into New Weapon Systems and Sensors



## COMNAVMETOCCOM

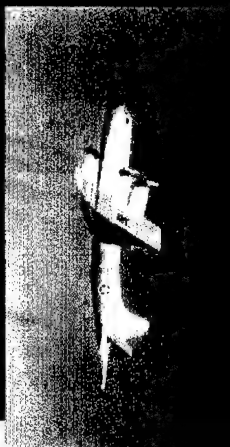
# Integrate Environmental Considerations into New Weapon Systems and Sensors



## COMNAVMETOCCOM

# Naval Meteorology and Oceanography

## *Data Collection*



**MAGNET**



**Drifting Buoys**



**PATHFINDER Ships**



**METOC Personnel**



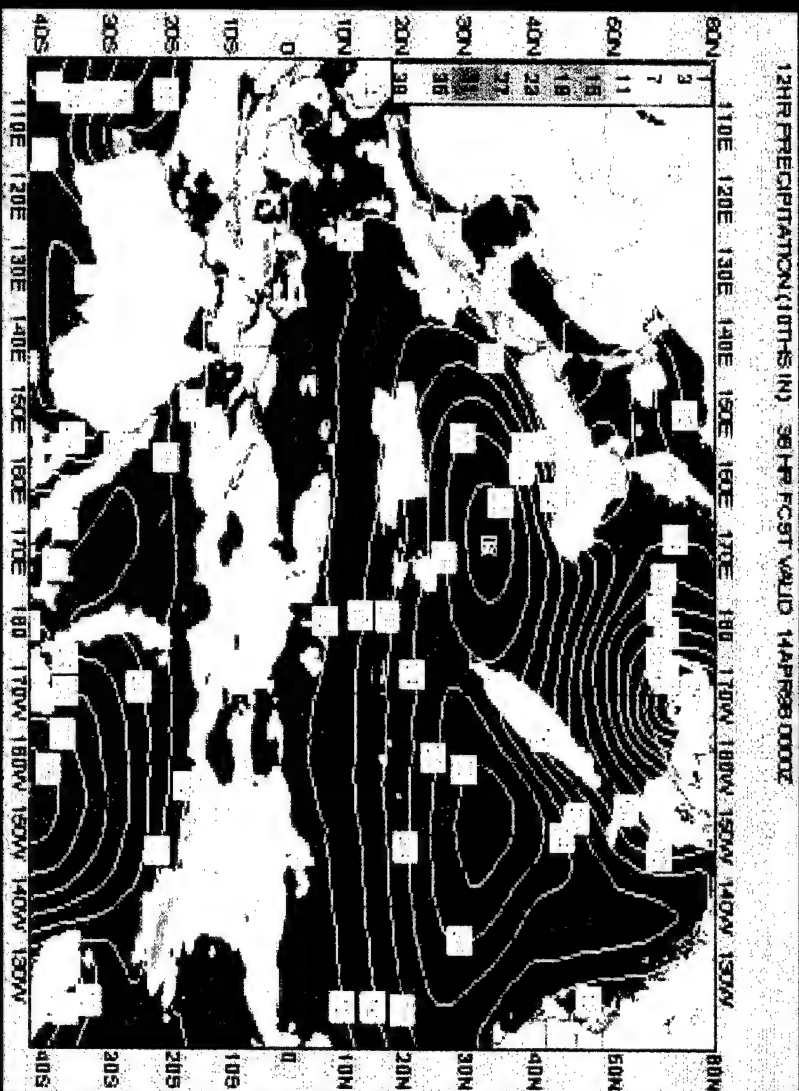
**Satellites**

# COMNAVMETOCCOM

# Naval Meteorology and Oceanography

## *Ocean Atmospheric Modeling*

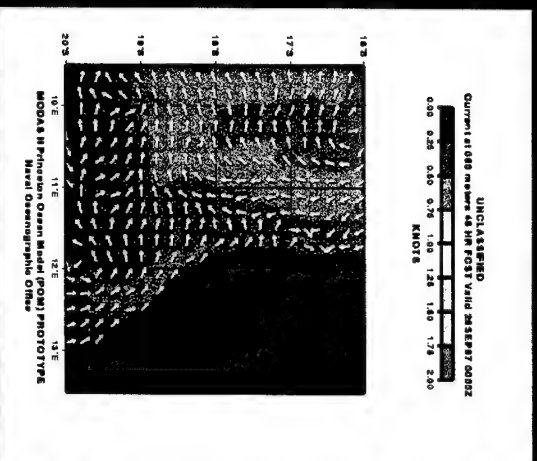
NOGAPS - COAMPS - Among the World's Best



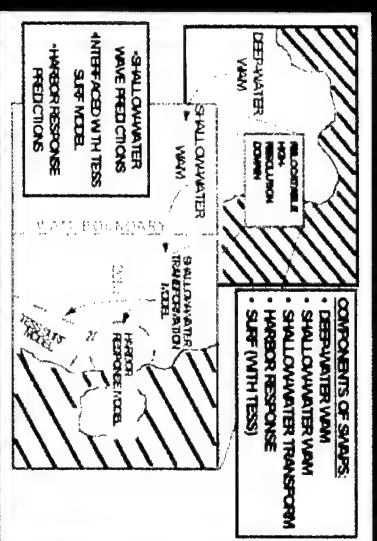
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# Naval Meteorology and Oceanography

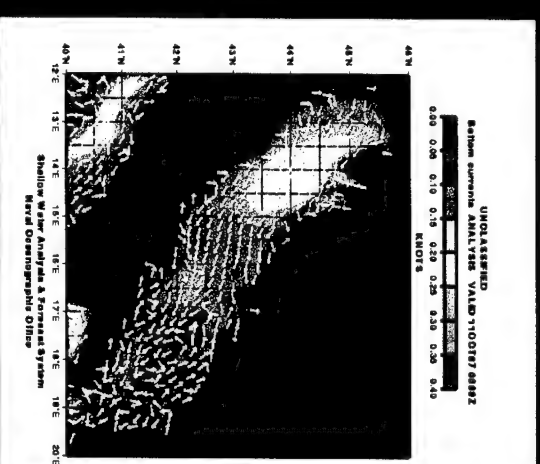
- Oceanographic Models
- *Understanding how the Oceans*
- *Impact Military Operations*



## 3-D Thermal Fields



## Spectral Wave Prediction System (SWAPS) Nested Components

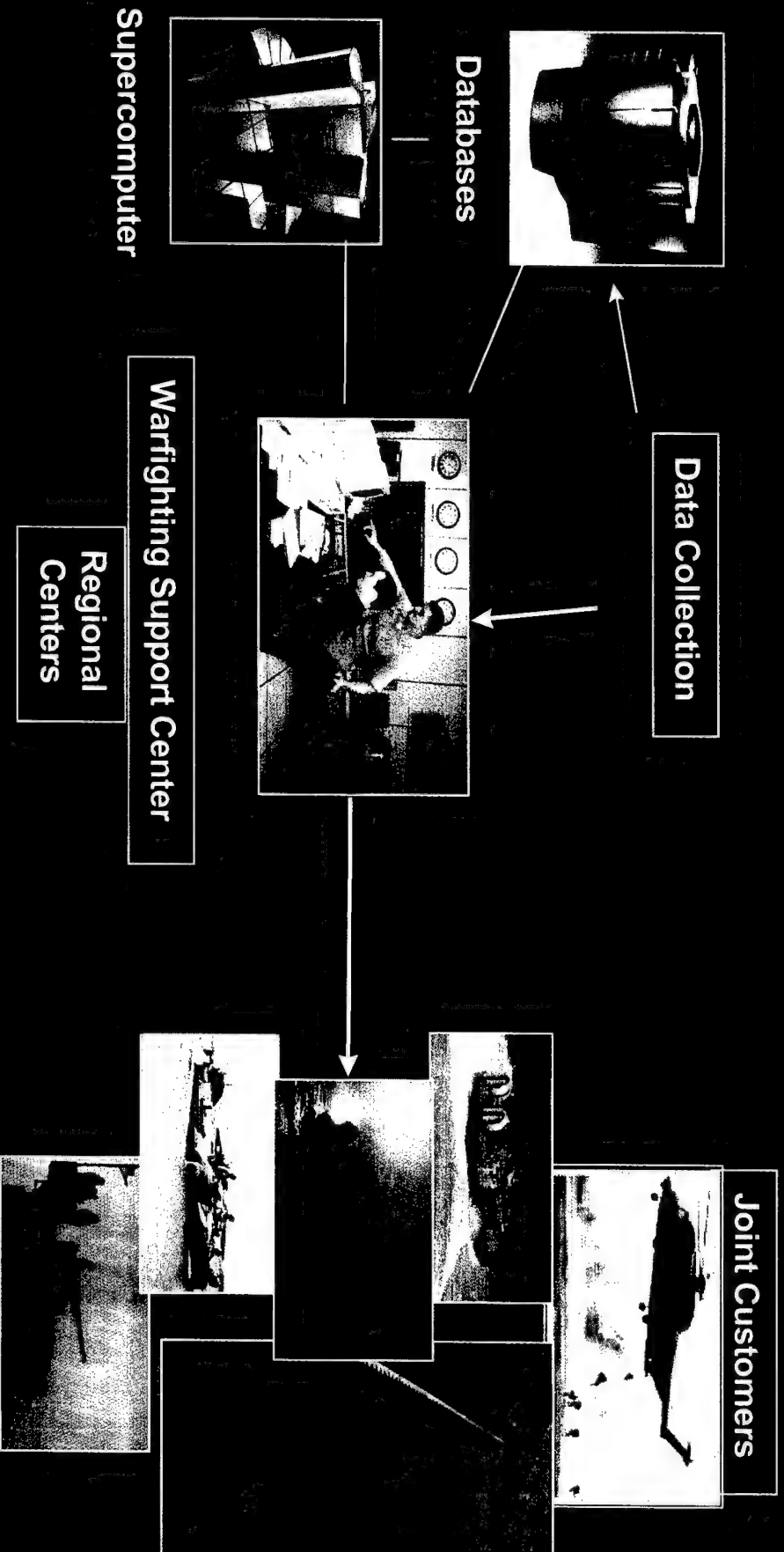


## Littoral Currents



# Naval Meteorology and Oceanography

## Warfighting Support



# Warfighting Support Center

## Today

- Application of Non-Traditional Data
- Knowledgeable Analysts
- Rapid Turnaround
- Operationally Relevant

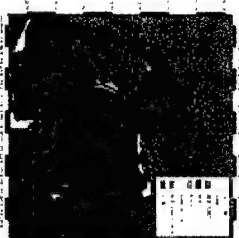


316000 18-4601

8.50'0"8



42-280-N  
2704000

4708000  
42-3007142-2867-  
6704000

42° 26' 0" N  
47° 00' 0" N



2. meter contour  
6. meter contour  
10. meter contour  
20. meter contour  
40. meter contour

**UNCLASSIFIED**

# NAVOCEANO WARTIGHTING SUPPORT CENTER

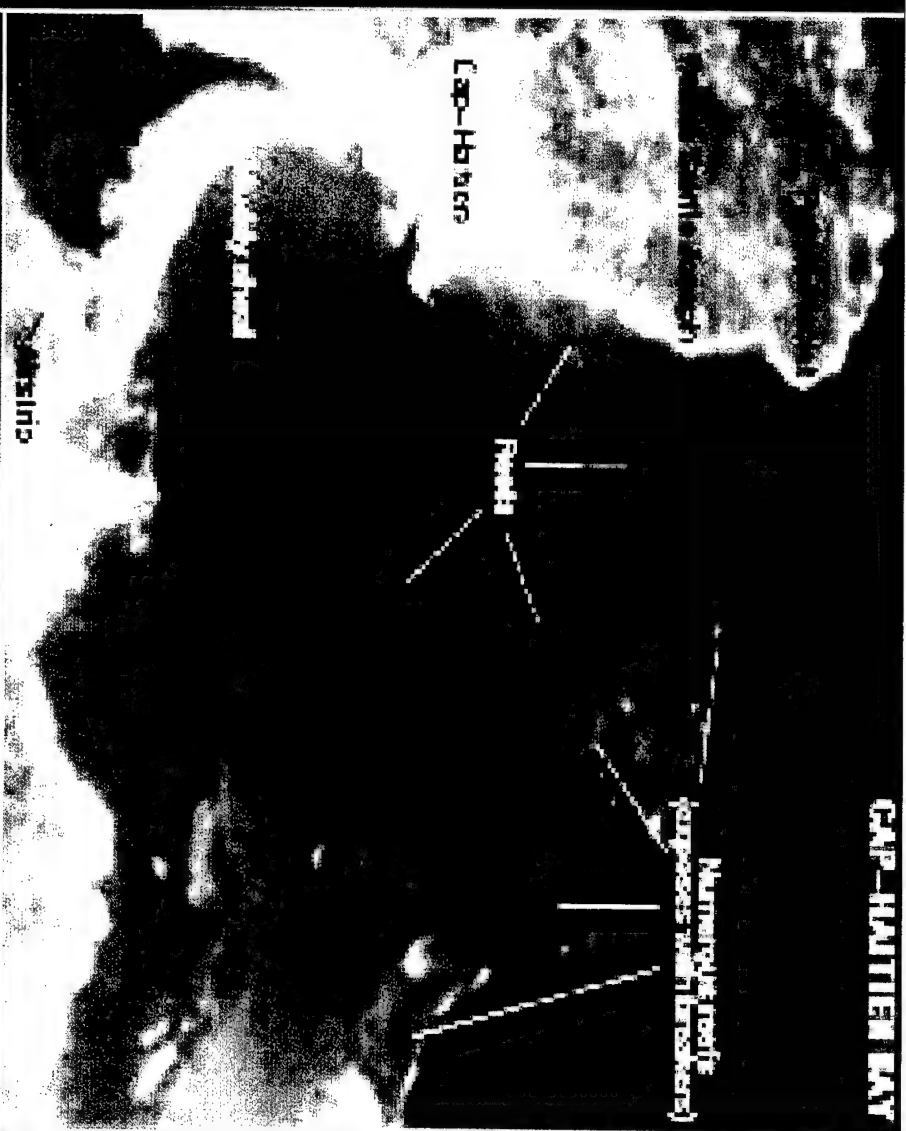


MEAN SURFACE CURRENT = 1.0 KNOT  
(Current sets E after several days of  
N or NW winds. S-setting current  
occurs at times.)

MEAN SEA DIR < 7 FEET (ANY MONTH)  
MEAN SWELL DIR < 12 FEET (ANY MONTH)

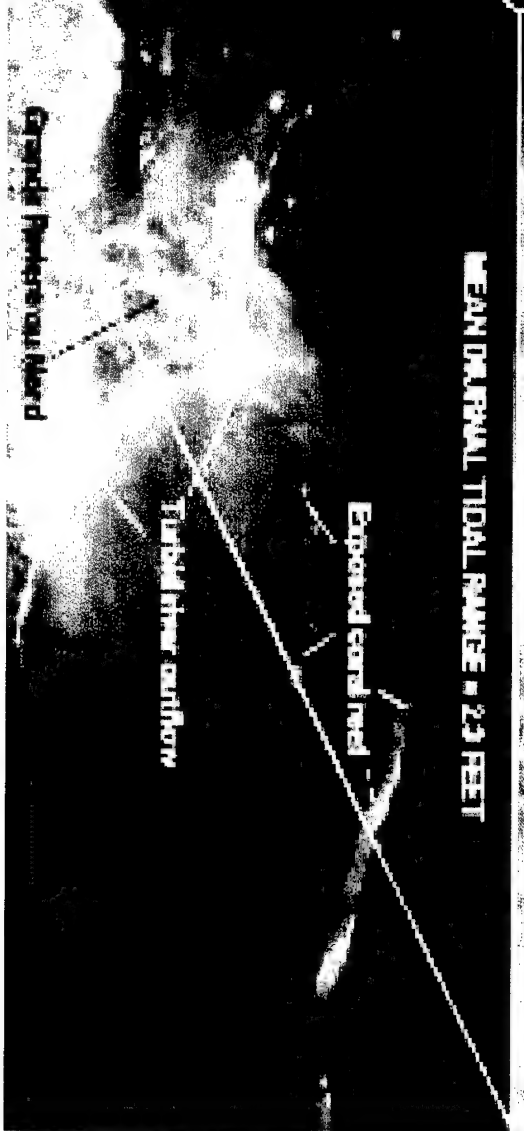


Alutia



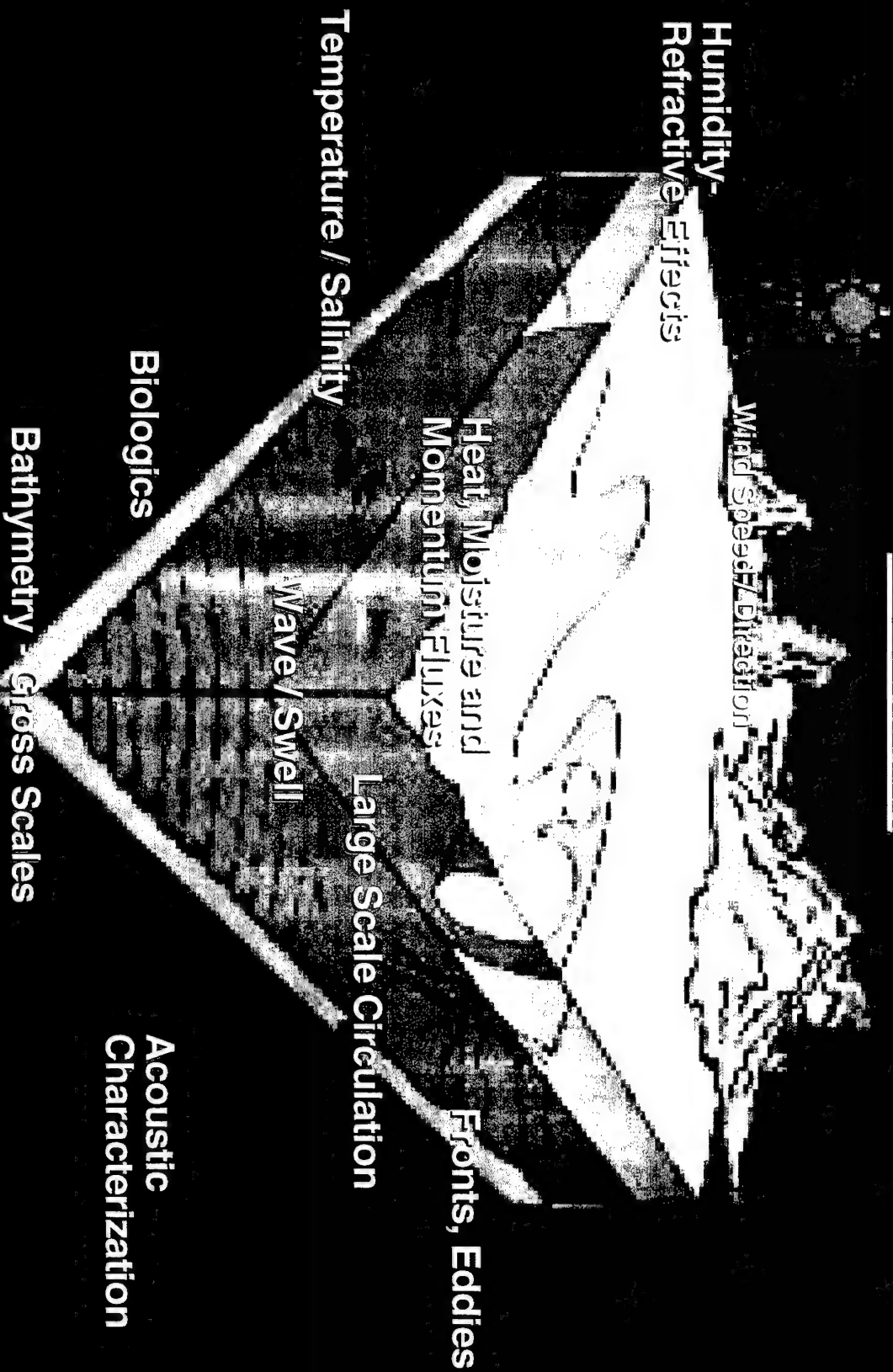
CAP-HAITIEN EAT

MEAN DAILY TIDAL RANGE = 2.3 FEET



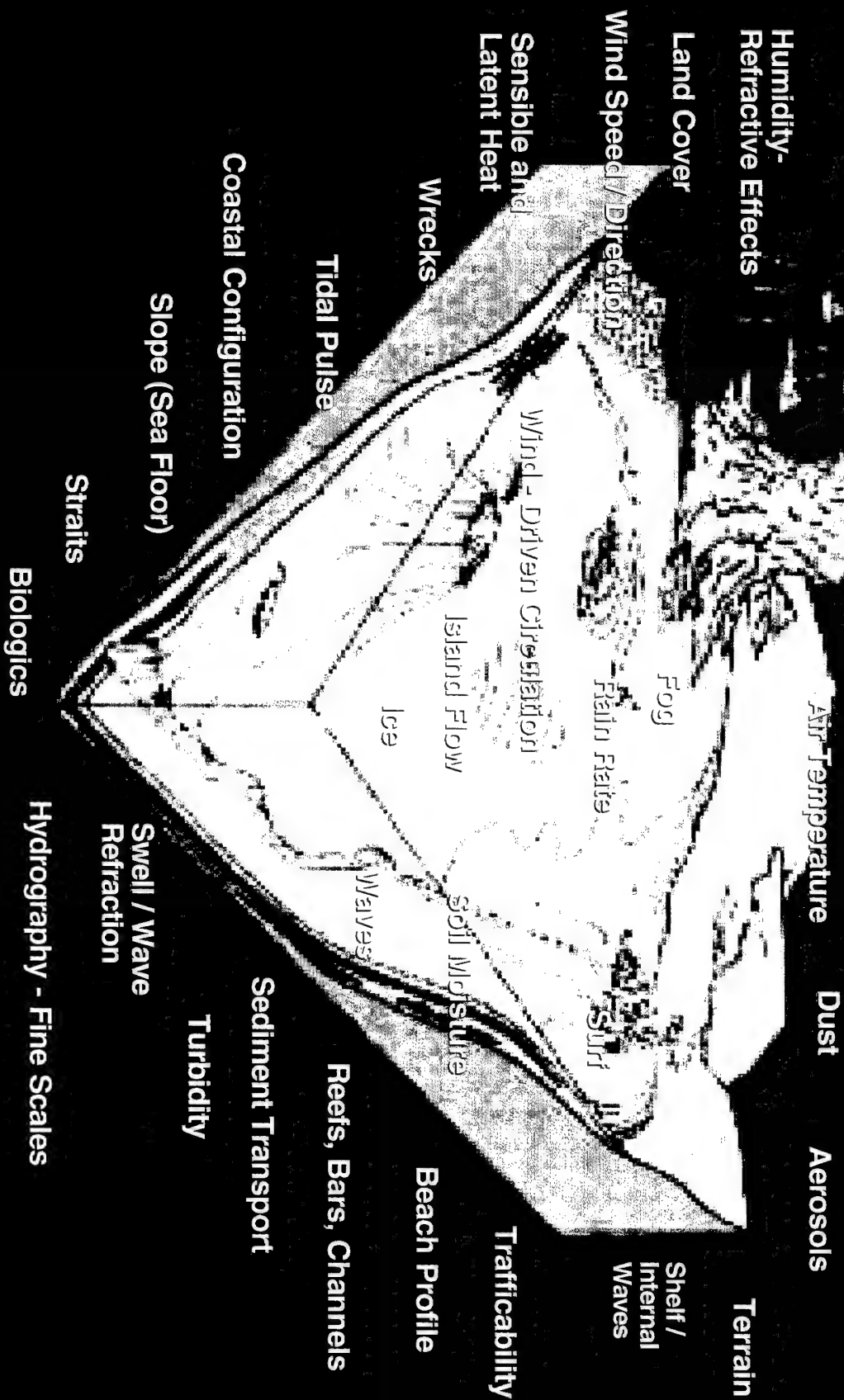
# Maritime Strategy

## Blue Water



# Forward . . . From the Sea

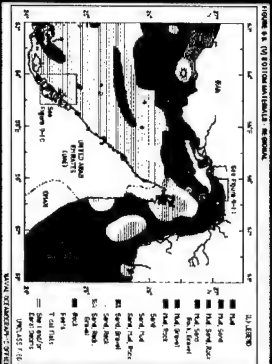
## Littoral





# Data Collection

- AUV
- UUV
- Satellites
- LABS



# 21st Century Challenges

## High Resolution

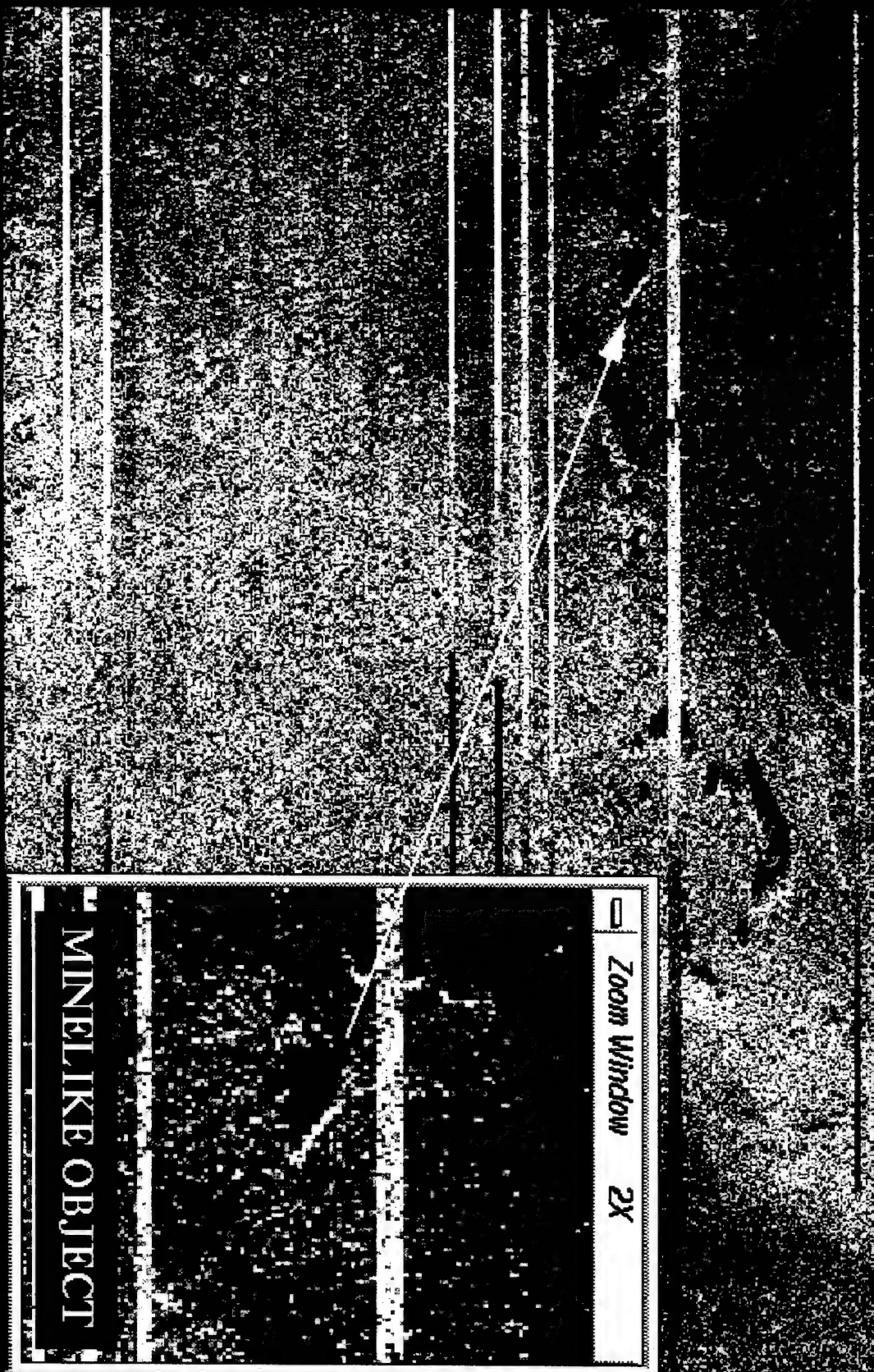


**Side Scan Sonar Digital Rendition of Panamanian  
Freighter Antares**



# 21st Century Challenges

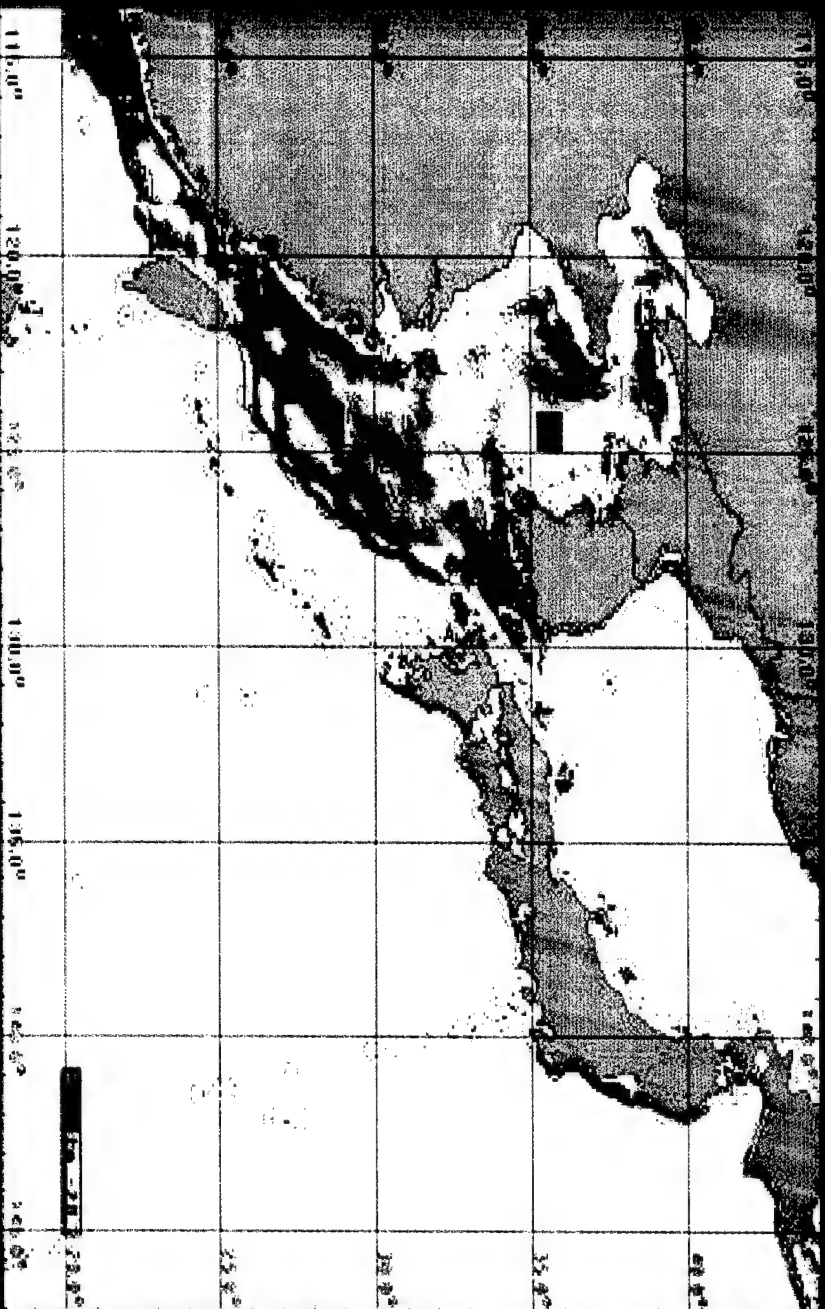
## High Resolution



KLEIN 5000 ACOUSTIC IMAGERY

# 21st Century Challenges

## Global Requirements



Each Dark Area is 1 month of Ship Surveying -  
240 Ship Years of Worldwide Survey Backlog

# 21st Century Challenges

*New Sensor Technologies -- Our Concerted Effort*



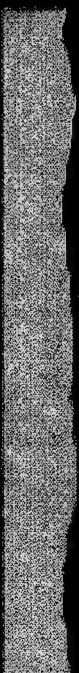
## Laser Airborne Bathymetry

- Still Very Expensive
- But Quick and Accurate

Laser  
Pulse

Surface Return

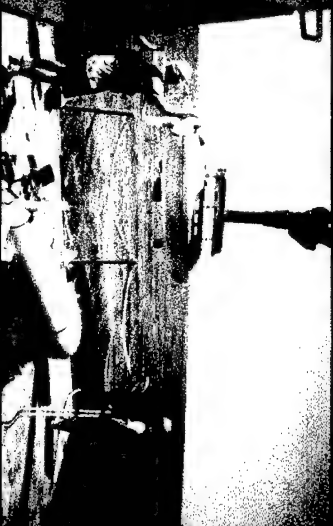
Bottom Return



# 21st Century Challenges

## *New Sensor Technologies -- Our Concerted Effort*

- AUVs - A Force Multiplier
- Multi-mission/Multi-sensor
- Survey Force Multiplier
- Annual AUV Fest
- Allows Academia & Industry to Demonstrate Latest and Greatest AUV Technology
- Synergism and Partnering at It's Finest

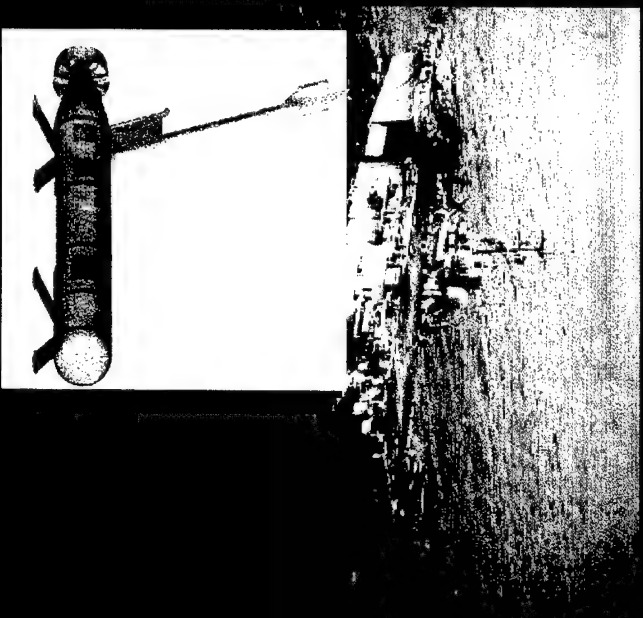


# COMNAVMETOCOM

# 21st Century Challenges

## *New Sensor Technologies -- Our Concerted Effort*

- Remote Minehunting System (RMS)
- Large Program
- Hope to Eventually Capitalize
- Incorporate Data Collection
- Developing Technology helps
- with UUV Development



# COMNAVMETOCOM

# 21st Century Challenges

## Operational Relevance

- Rapid Environmental Assessments (REA)
- Combatant Collection (CDC)
- Denied Areas
- 



*COMNAVIAVMETOCOM*

# 21st Century Challenges

## *Ocean Atmospheric Modeling*

- Large Forecast Time Scales
- Higher Resolution / Fidelity (vertical & horizontal)
- Rapidly Relocatable
- Coupled Models (ocean & atmospheric)
- On-Demand Numeric Modeling Output



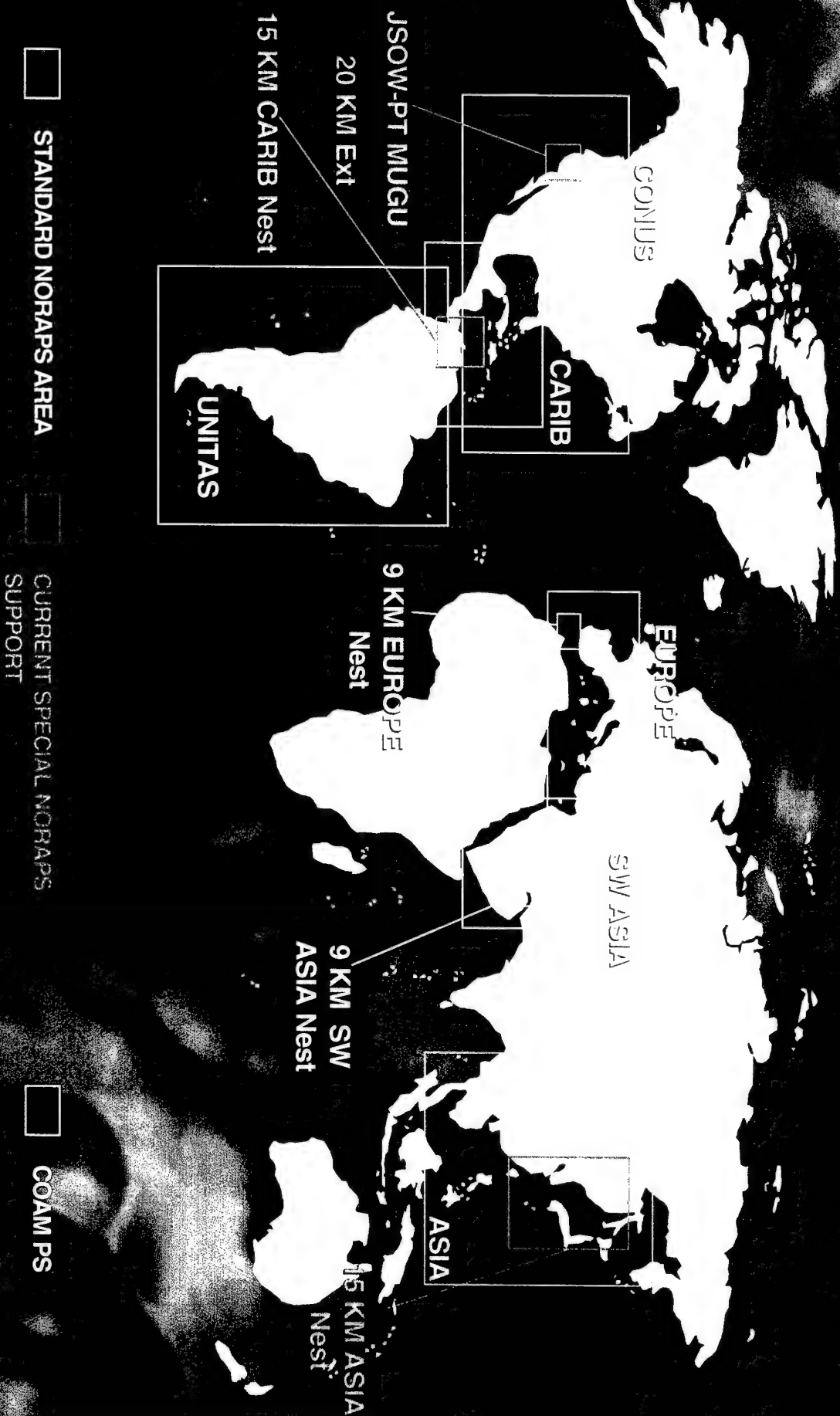
# COMNAVMETOCOM



# *Ocean Atmospheric Modeling*

## *Critical to Expeditionary Warfare Operations*

### *Today and Tomorrow!*



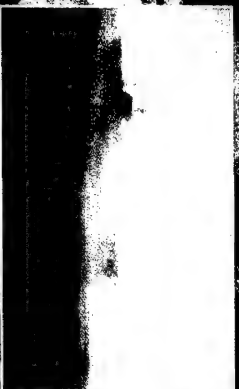


# 21st Century Challenges

Warfighting Support Center

Tomorrow

- Smart Processing
- Hyperspectral Imagery Applications
- Visualization Techniques (Virtual Reality)
- Artificial Intelligence
- Near Real Time Data Transfer (LEO)



# Final Thoughts

## Naval Meteorology and Oceanography

- Committed to the Warfighter
  - World Leader in METOC and GIS
  - Forward Deployed and Ready
- Focussed on the Future

# **SUBMARINE MINE COUNTERMEASURES**

**National Defense Industry Association**

**Expeditionary Warfare Conference**

**2-5 November 1998**

**Presented by CDR Paul Bienhoff, U.S. Navy  
Deputy Director, Deep Submergence Systems  
(CNO N873B)**

**held at**

**THE BAYPOINT MARRIOTT**

**Panama City, Florida**

## Submarine Mine Countermeasures – CDR Paul Bienhoff

Presentation to NDIA Expeditionary Warfare Conference

3 November 1998

### Slide 1 – Introduction

Good afternoon General, Admirals, distinguished guests and friends of our Navy and Marine Corps expeditionary forces. I'm Commander Paul Bienhoff, and I've been the Navy's UUV sponsor on the CNO staff for the last 5 years, as well as the Submarine Warfare Division liaison with the Mine Countermeasures Branch and Expeditionary Warfare Division since it was formed.

I hope to give you a sense of what is possible now and suggest a viable path to revolutionary improvements in how we can cooperate in the future to combat our nation's adversaries in their littoral seas. I'm here to discuss the role submarines play in today's expeditionary operations, as well as a Submarine Force vision of how we could conduct these operations in the future.

I'd appreciate your holding any questions until I complete my prepared remarks. If you can't hear me, or find me accelerating my speaking to Warp 9, give me a signal (polite but firm is good!). I'll regroup and try again either slower or louder (and with feeling). (Pause) (Next)

## Slide 2 - Outline

This afternoon I'll be describing how submarines fit in the joint task force effort to prepare the battlespace today. I'll also suggest a way all of our expeditionary forces can contribute to sea dominance in future conflicts. I hope you'll find this vision useful in your thoughts of how your efforts can fit to help in this most challenging environment.

I'll then give a brief review of the mine reconnaissance process, followed by an overview of how submarines and UUVs contribute to the Navy's sea dominance and MCM capabilities today, along with some exciting new technologies that can give future Joint Task Force commanders a decisive edge over our potential adversaries as we move "Forward . . . From the Sea", from the deep ocean, across the littorals and to the critical objectives ashore.

I'll conclude with the submarine force recommendations for a path to achieve this new capability through the cooperation of the Defense and Navy research organizations, the platform sponsors AND our industry partners, many of whom are here today. (Next)

### Slide 3 - Battlespace Preparation - Common Tactical Picture - Intelligence

Here you see what our forward-deployed submarines contribute to the Joint Task Force common tactical picture today:

The submarine collects intelligence that supplements and fills in gaps left by other defense and national sensors off the shores of our potential adversaries. The submarine is the ONLY source of certain electromagnetic signals of low amplitude or high frequency as well as some of our visual intelligence - SIGINT and VISINT. It also collects data related to the acoustic conditions, as well as the sea and weather environment - ACINT, and environmental intelligence. The fact that a submarine collects this intelligence in a non-detectable and non-provocative manner can be extremely helpful in providing measures of an adversary's true capabilities and intentions, unvarnished by posturing and grandstanding that might be intentionally deceptive.

#### Slide 4 - Battlespace Preparation

While the submarine is collecting the specific intelligence related to adversary force activity clandestinely, it monitors and measures conditions relevant to possible JTF operations in the littoral operating areas - well in advance of tasking of other forces. (Next)

Some of the specific environmental factors are listed here.

UUVs expand the submarine's sensor fields into the areas near shore and other areas where the submarine's presence would be undesirable. The Long-term Mine Reconnaissance System (LMRS) is intended to operate in the shallow water areas as shown here. The bottom conditions as well as the other environmental intelligence found can provide the JTF commander with a substantial advantage in operational planning. (Next)

#### Slide 5 - The Prepared Battlespace

As you can see here, the environmental intelligence is collected and assimilated in a common tactical picture. With this comprehensive layout of the battlespace, the JTF can execute a variety of operations effectively, without giving the adversary warning. (Pause) (Next)

Slide 6 - The Mine Reconnaissance Process (Outline) (Next)

Slide 7 - Where's Waldo

The littoral battlespace can be incredibly complex, both oceanographically and with numerous objects complicating our efforts to paint a useful tactical picture for conducting MCM. As RADM Horne has pointed out so often, playing "Where's Waldo" is not conducive to those forces planning operations in mineable waters. (And for those of you who play this game - Waldo is not on the screen (and I don't plan on leaving this slide up long enough for you experts to prove me wrong!)) (Next)

Slide 8 - NOMBO Density

As you all know, distinguishing contacts on the bottom, particularly using sonars, is complicated severely by Non-Mine Bottom Objects. This depicts a littoral operating area with about 8 NOMBOs per square mile, over a 37 and a half square mile area. Not a pretty picture for MCM, but it is relatively benign compared to some areas of possible interest for future JTF operations. (Next)



## Slide 9 - Mine Reconnaissance Process

You're all familiar with the process. I've added Step 2, "Discrimination" between Detection and Classification to describe an intermediate step that can reduce the complexity of the subsequent reconnaissance events. (Pause) (Next)

## Slide 10 - Mine Reconnaissance Process

Today's mine reconnaissance platforms and the sensors they use almost mandate a sequential step for each of the events. We would all like to conduct the mine reconnaissance process concurrently - allowing a seamless transition that speeds the process substantially. I think it's been said: "All we need is speed." (Next)

## Slide 11 - Submarine and UUV MCM (Outline) (Pause) (Next)

## Slide 12 - HF Submarine Sonar

This slide shows some key characteristics of a submarine's Ahead Looking Sonar. A wide swath and fine resolution sonar can collect the information needed to prepare a precise map of the ocean bottom. (Next)

### Slide 13 – Minehunting Search Sonar- Toroidal Volume Search Sonar (TVSS)

The Toroidal Volume Search Sonar has useful features for minehunting in deep water that are ideal for volume, near-surface and surface mines. A possible limitation is that its narrow beams may not “paint” bottom targets often enough to ensure the targets are all detected. An Ahead Looking Sonar may be needed to avoid obstacles, and fill in gaps in coverage of bottom targets.

### Slide 14 - Minehunting Search Sonar – Side Looking Sonar

The Side Looking Sonar is very useful for minehunting due to its capability to provide multiple looks and to incorporate Computer-Aided Detection/Discrimination. A mine reconnaissance vehicle using SLS still needs a sensor to allow obstacle avoidance and to fill in the gap directly below the vehicle.

### Slide 15 - ASHEVILLE's ARCI EDM

This slide shows the Engineering Development Model of the submarine high frequency sonar installed on USS ASHEVILLE. This is a prototype for the Acoustic Rapid COTS Insertion (ARCI) Phase IV high

frequency sonar that will be installed on all of our Improved 688 class submarines by the end of the year 2000. This sonar uses a 24-channel active projector to produce active transmissions that are received by the 800-element hydrophone array on the submarine sail. ASHEVILLE is at sea using this sonar today. (Next)

#### Slide 16 - ASHEVILLE's ARCI EDM - Images

This is an image produced by the ASHEVILLE's HF sonar. As you can see, the image shows the undersea topography ahead of the ship, and shows the elevations and slopes of the undersea features that could be used to produce a detailed hydrographic chart. What follows is a series of images collected by ASHEVILLE while operating at seventeen knots about 250 fathoms above the bottom in the submarine operating areas near Hawaii. (Next) (Video clip)

(Pause until circular feature is displayed)

Of note, the somewhat circular feature you'll see on the display WAS an ancient undersea volcano, known as a caldera, that hadn't been observed or charted before ASHEVILLE passed over it. (Next)

## Slide 17 - Precision Navigation

Here is another use for the precise data collected by a platform, in this case a submarine. The precise location of bottom features and the exact distances between them, shown as vectors on this slide, provide the location of those features relative to the platform. (Next)

By matching the data collected on subsequent transmissions, the precise location of the platform can be calculated from the relation to the bottom objects detected earlier. (Next)

The chart on the lower left shows the navigation accuracy expected when using GPS, inertial navigation systems, Doppler-aided INS and precision bottom mapping. It is this highly accurate data we expect to collect from our mine reconnaissance sensors - and those of all of the other platform's sensors, as well. (Next)

Slide 18 - NOMBO Density (Repeat) (Next)

## Slide 19 - Reduced NOMBO Density

This slide I showed earlier with 8 NOMBOs per square mile looks like a pretty difficult environment for mine reconnaissance. By using the ability of a high-definition sensor, such as the HF sonar on ASHEVILLE, areas surveyed can be “de-cluttered” by use of computer-aided detection and discrimination algorithms. By precisely locating those objects that remain, and capturing the locations and characteristics in a mapping data base, the next platform operating in the same area will be able to compare new images, overlaid on the precision map prepared previously- and detect changes that could reflect presence of mines, obstacles or other objects of tactical interest. Instead of playing “Where’s Waldo” with thousands of objects of unknown characteristics, we expect to be able to precisely locate a relatively small number of newly placed objects, and know their characteristics as mine-like, or not. (Next)

## Slide 20 - Mine Search Sonars – Ahead Looking Sonars

This slide shows the characteristics of Ahead Looking Sonars that facilitate the precise mapping and navigation I just described. (Next)

## Slide 21 - Precise Undersea Maps

Here you see the type of detail that can be produced by the Ahead Looking Sonar on ASHEVILLE. The mine-like targets have been highlighted by the sonar's CAD, and the sonar operator annotated them as either bottom or moored, based on the depth of the contact with respect to the surrounding bottom. (Next)

## Slide 22 - Precision Bottom Mapping

This is a 3-D view of a portion of the previous map, using a larger scale, showing MLOs marked by the operator, and the bottom features of this small tactical area. (Pause) (Next)

## Slide 23 - Waypoint Planning

Here's another 3-D map with some examples of ways we can use precise maps for mission planning. (Pause) (Next)

## Slide 24 - HF Submarine Sonar Mapping – Data Compression

Of course, there's a possible problem - how does the JTF commander get the mapping data from the submarine? As you can see, if we wanted to transmit the receiver element data, and used some of the satellite communication capability available today, the submarine wouldn't be able to get the data out in time to be useful, not to mention tying up all the world's available radio-frequency bandwidth. Fortunately, there's technology available to help. By electronic magic, and the wonders of computer processing, the same data that would have taken 18 hours to transmit can be processed and compressed into a useful, high definition map that can be transmitted in 32 seconds. The details on this chart are typical of data gathered for a precise map of an ocean area of 6 square nautical miles. (Next)

## Slide 25 - UUVs

Of course, one of the key issues for MCM is conducting surveys and mapping of areas that could be mined without endangering the crews of our ships, submarines and aircraft. The UUV is one way to do this, and the only way currently planned to do this type of survey clandestinely. (Next)

## Slide 26 - UUV Sensor Comparison

Now for the UUVs. As you can see, the Near-term Mine Reconnaissance System (NMRS), which uses its ahead looking sonar for detection and discrimination, and its side looking sonar for classification, can't classify all of the objects it detects in a single pass. This gap can be filled by maneuvering the vehicle to pass closer to the objects outside the side scan sonar swath, but if this is done in a high clutter area, there's a severe reduction in the area NMRS can cover during a sortie. The resolution of its ahead looking sonar is not as fine as that from the submarine sonar described above, nor is there an upgrade planned that would allow NMRS to collect and process the data needed for a precise map. Because NMRS is a one-of-a-kind, prototype system intended as a stop-gap until a much more capable system is developed, the effort and cost required to include the precise mapping features in NMRS wasn't considered cost-effective.

The expected LMRS sensor swaths aren't shown on this slide, but what IS shown is our vision of possible improvements that might both expand the LMRS or other future UUV ahead looking sonar swath and resolution. To reduce the gap between the maximum width of the detection or discrimination sensors and the classification sensors, use of synthetic aperture sonar (SAS) may be able to give future MCM



platforms the long range and high resolution to conduct a single pass that classifies ALL objects detected. By using the SAS only when required to classify the objects discriminated as mine-like by an improved UUV ahead looking sonar and improved associated CAD, power required to operate the SAS could be kept low, allowing follow-on UUVs to maintain long endurance (40-62 hours specified for LMRS), high Area Coverage Rate (ACR) (35-50 square nautical miles per day) and Total Area Coverage (400-650 square nautical miles for a nominal 6-sortie LMRS mission.) (Next)

Slide 27 - Summary (Next)

## Slide 28 - Environmental Intelligence

So, now that the JTF commander has precise maps of the planned operating area, how can they be used? The submarine can use the data in planning ASW and ASUW missions - having the in situ data and inserting it in improved ocean models that include bottom slope and topography along with acoustic characteristics will allow accurate prediction of detection ranges of threat contacts, and facilitate optimum sonar searches. (Next) These same models will allow us to place Advanced Deployable System surveillance arrays in key locations and will allow us to essentially “calibrate” the performance of the ADS sensors. (Next) The Special Operations Forces needed for early effective action ashore will know a safe route to the beach, where to moor their vehicles, conduct ingress and return safely to their host ship. (Next) The Airborne MCM and Surface MCM forces employed will be able to accelerate their operations to facilitate rapid minehunting and clearance, since the operating area will have been precisely mapped and re-mapped by platforms well in advance (in particular by clandestine submarines and UUVs). (Next) And finally, when the need to conduct an amphibious assault is crucial - the Amphibious Ready Group will be able to go ashore rapidly and safely. (Next)

## Slide 29 - Summary

I've been addressing a submarine force vision. There are a few small details that need to be addressed by the people at this conference and the organizations they represent.

The production ARCI ahead looking sonars needed for precision mapping and navigation capabilities will be resident in the submarine force starting next year. The supporting algorithms are funded for implementation beginning in 2002.

Littoral ocean models that will accept the precision data, give accurate predictions and be used easily by MCM forces are still needed.

Synthetic Aperture Sonar, though similar in some respects to the synthetic aperture radar (SAR) that has been used to improve aircraft and satellite radar image resolution, still needs continued investment to become a useful tool for high resolution undersea imaging. The promise is exceptional, and if SAS meets its promise, may result in sufficient image resolution to raise the classification confidence to near-identification levels. This won't happen overnight, unless one or more of you know something the rest of us would really like to know.

Organic, Dedicated and Supporting MCM requires an architecture standard. The parameters shown here are important - but there are others. In order to make precision maps useful throughout our MCM forces, the maps must be in consonance with a format that all MCM platforms and sensors can use and update.

The value of this capability can be maximized by the cooperation of the Expeditionary Warfare team members here. We hope to work with you to develop the technologies and systems that will allow us all to benefit.

Subject to your questions, this concludes my brief.

# **SUBMARINE MINE COUNTERMEASURES**

**National Defense Industry Association**

**Expeditionary Warfare Conference**

**2-5 November 1998**

**Presented by CDR Paul Bienhoff, U.S. Navy  
Deputy Director, Deep Submergence Systems  
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**Panama City, Florida**

## Submarine Mine Countermeasures



Presented to the  
NDIA Expeditionary Warfare Conference  
3 Nov 98



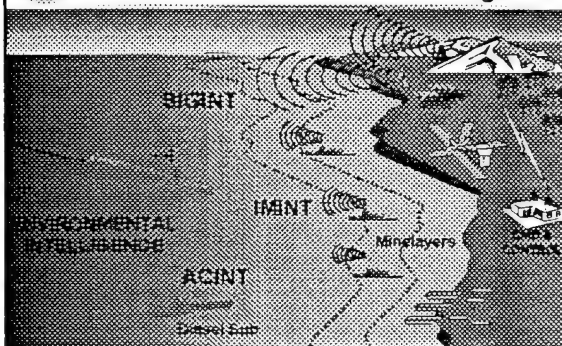
## Outline

→ *Battlespace Preparation*

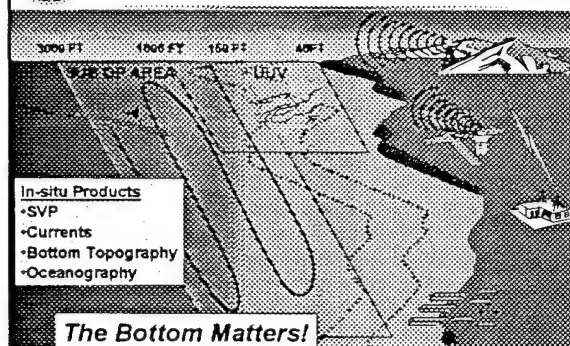
- Mine Reconnaissance Process
- Submarine & UUV MCM
- Summary



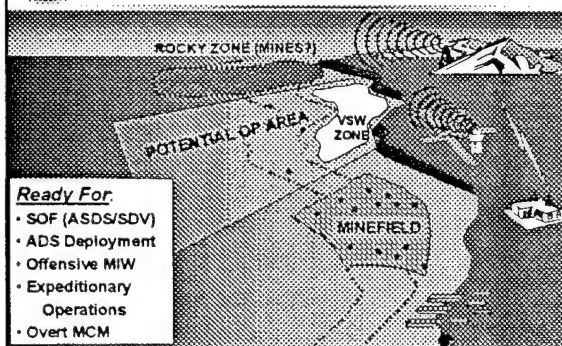
## Battlespace Preparation Common Tactical Picture - Intelligence



## Battlespace Preparation




## The Prepared Battlespace



## Outline

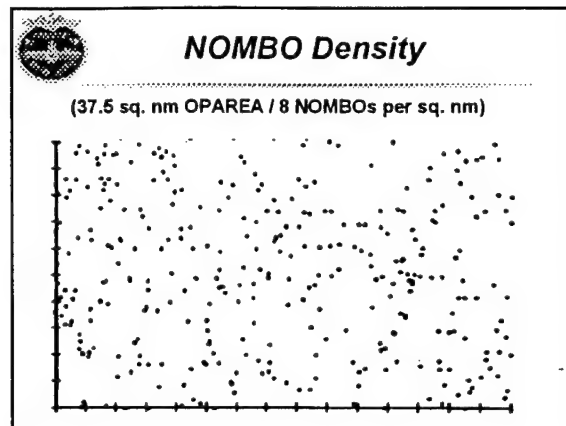
- Battlespace Preparation
- *Mine Reconnaissance Process*
- Submarine & UUV MCM
- Summary

**Mine Countermeasures in the Littorals "Where's Waldo?"**



Littorals Are Littered with Things that Appear "Mine-Like" to Our Mine-Hunting Sonars:

- Fish Traps
- Metal Trash/Debris
- Bottom Rubble
- Boulders
- Bottom Features



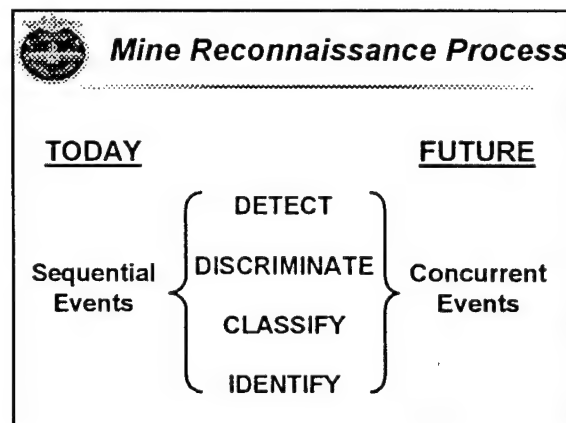
**Mine Reconnaissance Process**

STEP 1: DETECT Strong Echoes

STEP 2: DISCRIMINATE - Eliminate non mine-like objects (MLOs)

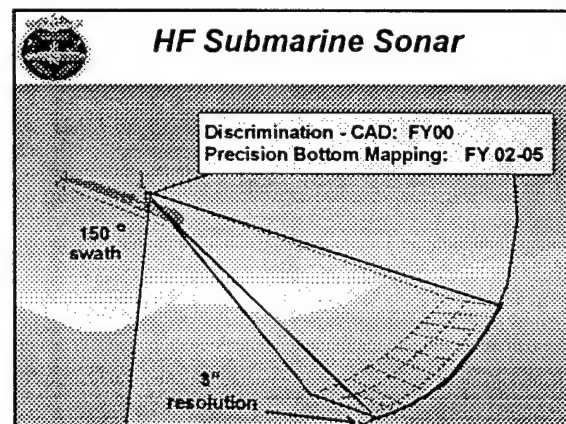
STEP 3: CLASSIFY as MLOs with high probability

STEP 4: IDENTIFY as mine



**Outline**

- Battlespace Preparation
- Mine Reconnaissance Process
- Submarine & UUV MCM
- Summary



### Minehunting Search Sonar Toroidal Volume Search Sonar

**Advantages**

- Ideal for Deep Water Full Volume Coverage
- High Resolution Depth Estimation

**Disadvantages**

- Few Looks, Limited CAD Performance
- Few Aspects, higher potential for missing bottom targets
- ALSS required to provide gap fill and obstacle avoidance

### Minehunting Search Sonar Side Looking Search Sonar

**Advantages**

- Ideal for Shallow Water Full Volume Coverage
- Moderate Resolution Depth Estimation
- Many Looks, Full CAD Performance
- Many Aspects
- Large Horizontal Aperture

**Disadvantages**

- ALSS required to provide gap fill and obstacle avoidance

### USS Asheville (SSN-758) EDM Installation

ARCI Phase IV  
All 688I's - IOC 00

- Terrain Profiling
- 3D Display
- 3D CAD

10x 10 elements per module

8 modules  
800 channel receive array

Sail Mounted

### USS Asheville (SSN-758) EDM At-Sea Today

### Precision Navigation

Previous Position Present Position

Bottom Features Overlap

Vector Distances

Previous Image Present Image

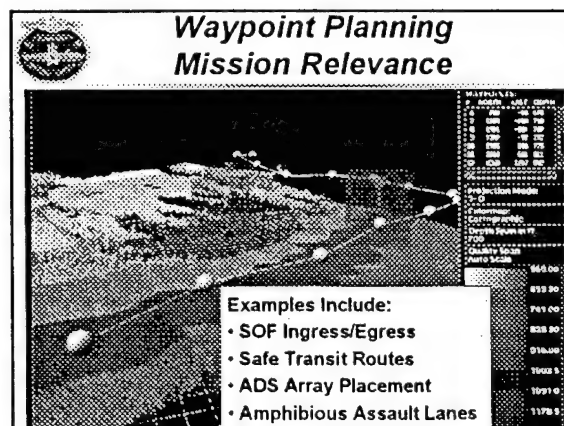
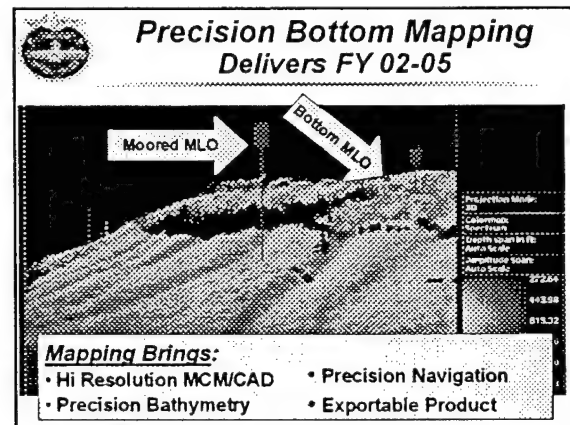
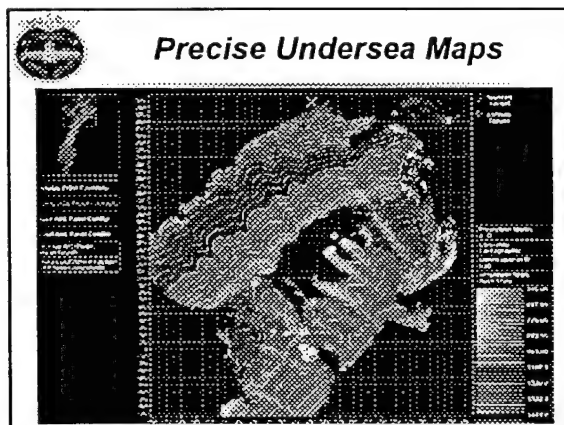
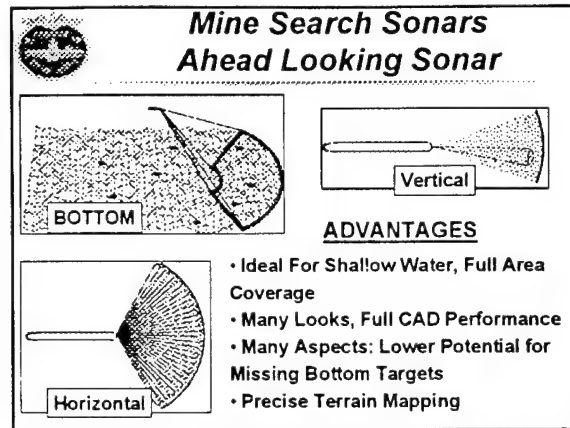
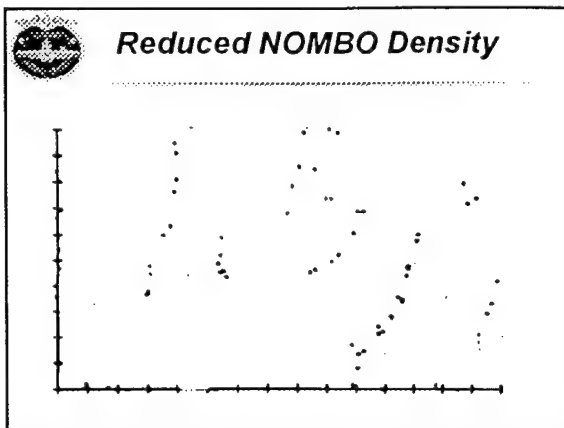
**Accuracy**

Accuracy	Accuracy (transit)
GPS	~15m
INS	100-200m
Doppler	
Aided INS	10-50 m
Precision Bottom Mapping	
Relative	1-5 m
Absolute	5-10 m

### NOMBO Density

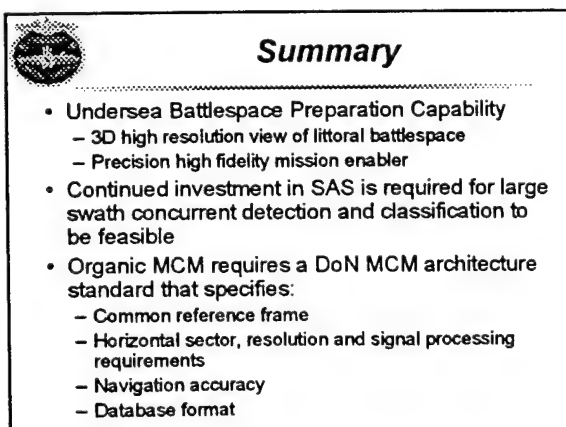
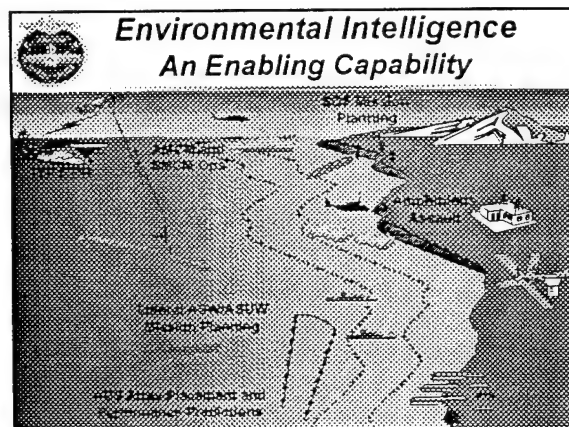
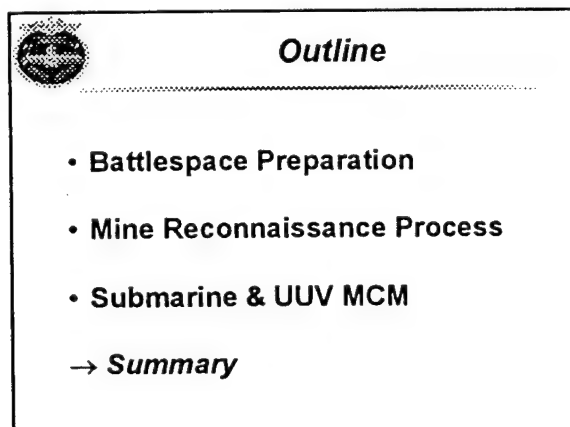
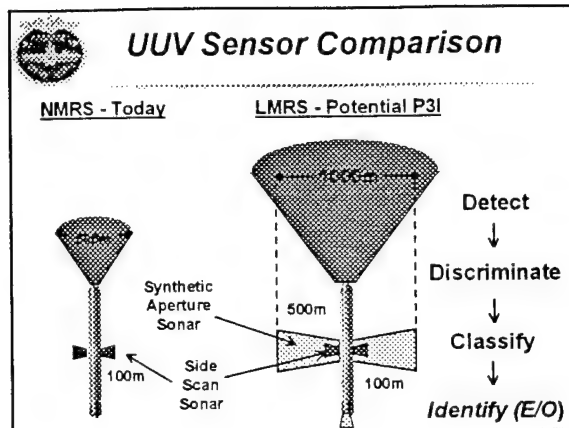
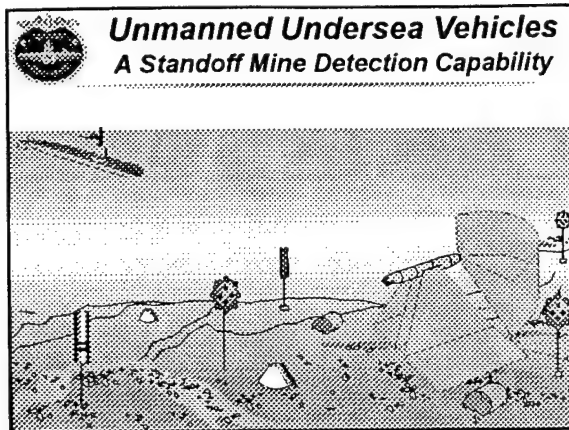
(37.5 sq. nm OPAREA / 8 NOMBOs per sq. nm)





**HF Submarine Sonar Mapping Output Data Rates And Tape Capacity**

MAP DATA PRODUCT	SINGLE PING PROCESSED DATA	MULTI-PING PROCESSED MAP	CONDENSED/COMPRESSED MAP FILE FORMAT
Receiver Element Level	481 GB/hr (2.8 min/tape)	-	-
Beamformer	72 GB/hr (18.7 min/tape)	-	-
MAP (Bathymetry, Targets, Navigation)	1 GB/hr	2 MB/hr	520 KB/hr
Map File Tape Capacity	18 hr/tape	320 days/tape	1600 days/tape
RF Comm Transfer @ 128 kbps (EHF MDR)	18 hr per 1 hr of data	2.8 min per 1 hr of data	32 sec per 1 hr of data



# **Concepts and Vision**

## **MCM Operations in the 21st Century**

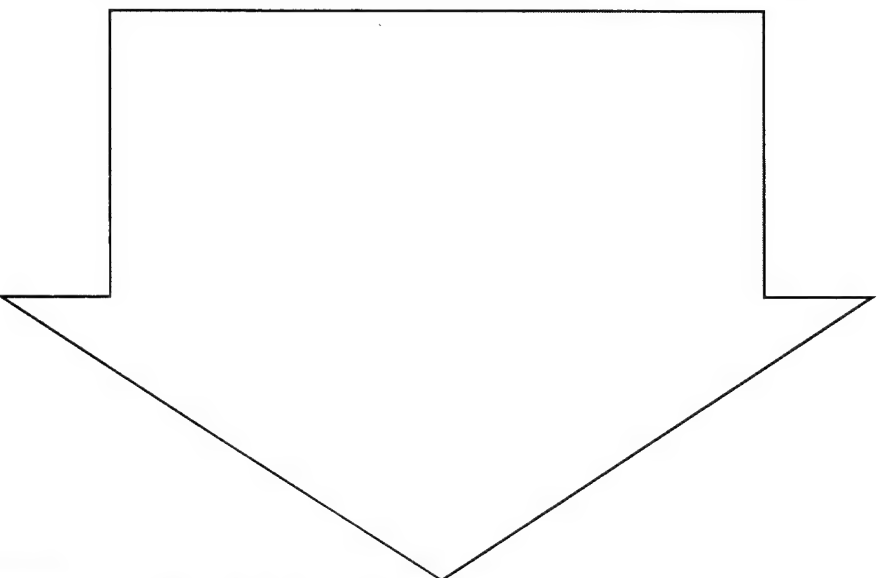


**RADM Denny Conley**  
**COMINNEWARCOM**

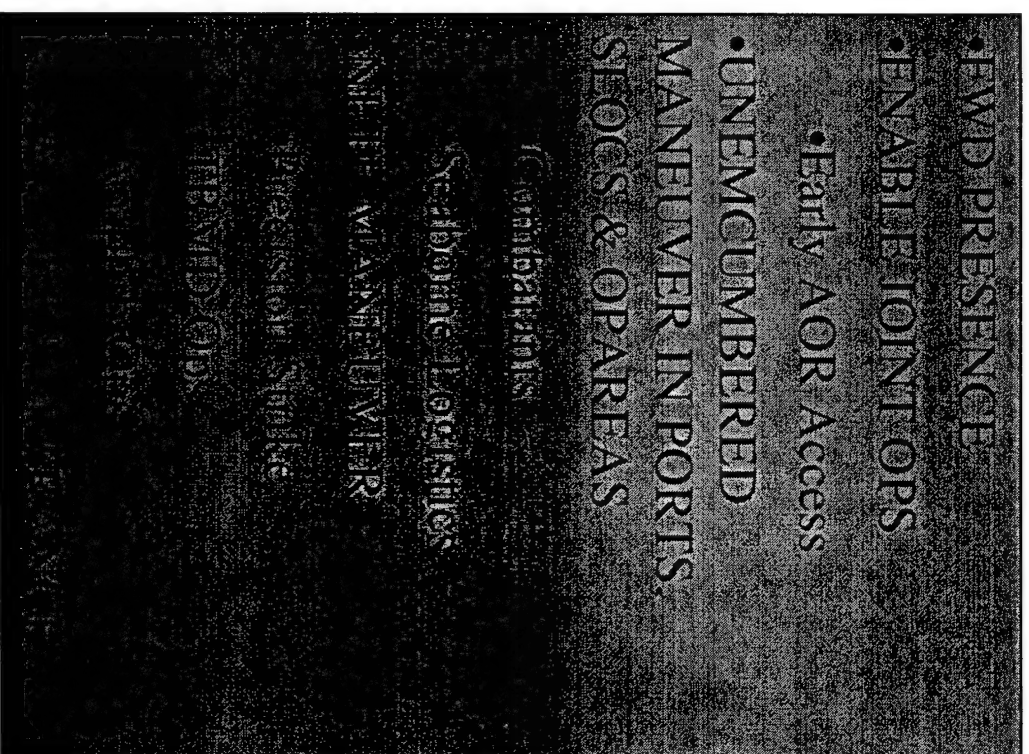
# Joint Warfighting Requirements

## JV 2010

- FULL  
DIMENSIONAL  
PROTECTION
- DOMINANT  
MANEUVER
- PRECISION  
ENGAGEMENT
- FOCUSED  
LOGISTICS



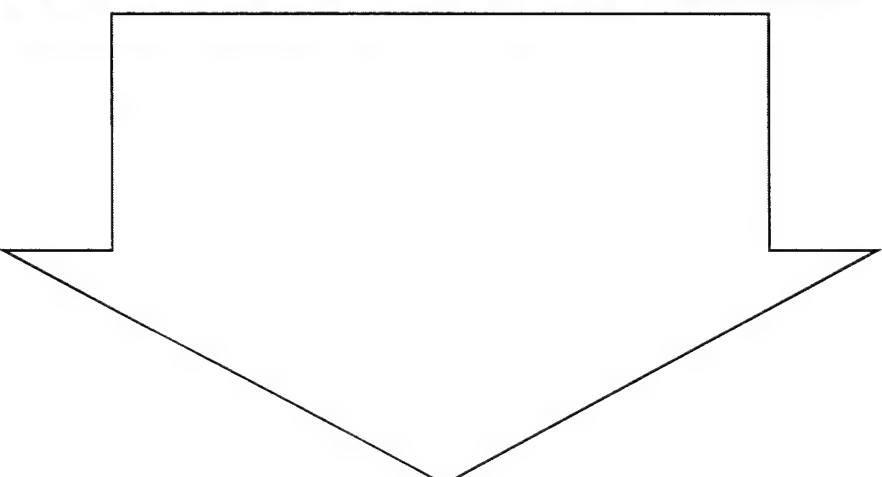
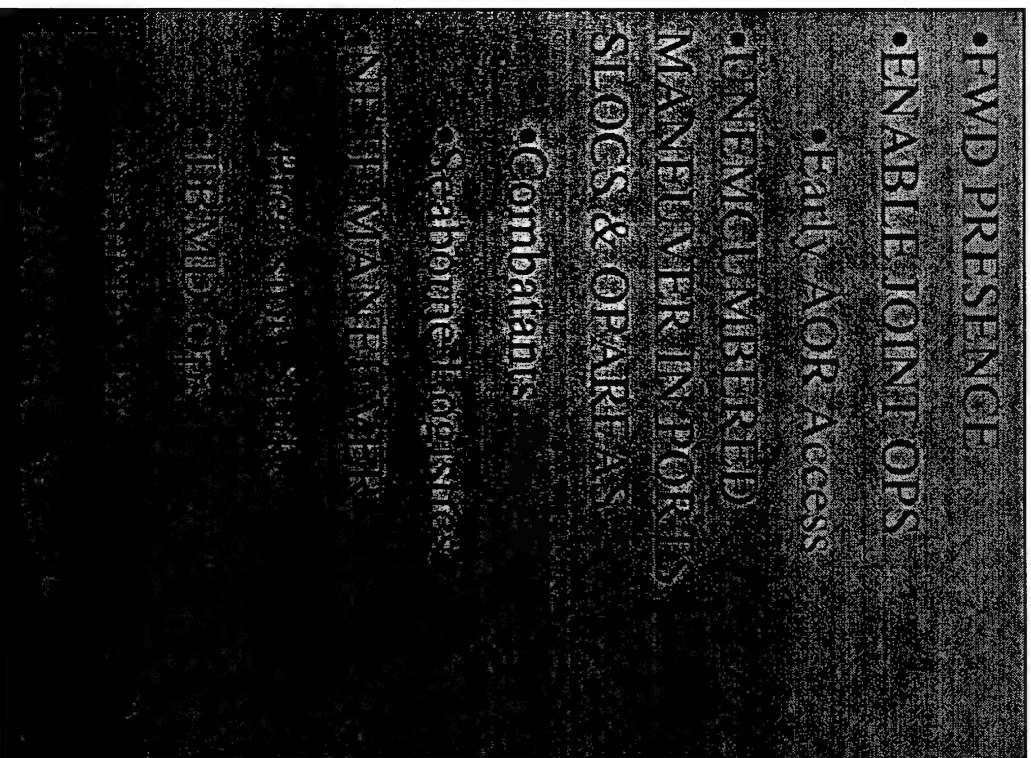
## NAVAL REQUIREMENTS



# Joint Warfighting Requirements

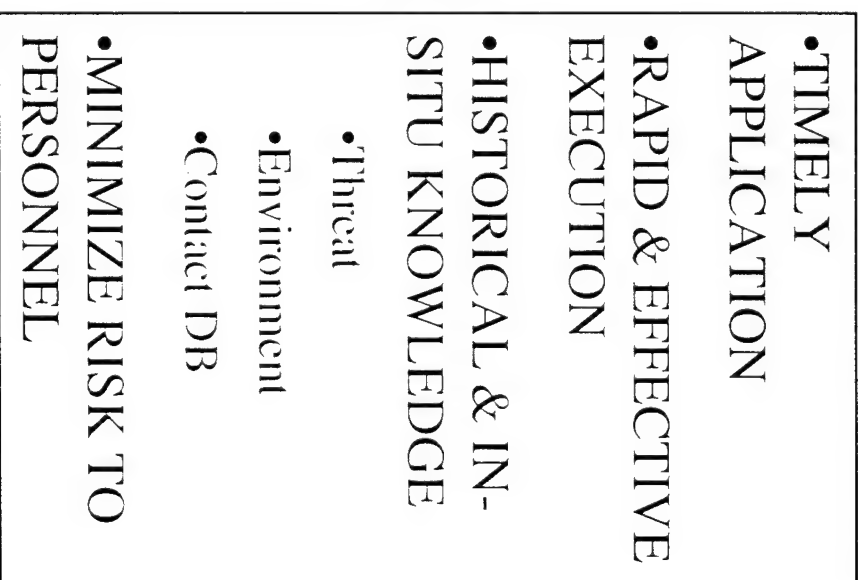
## NAVAL

### REQUIREMENTS



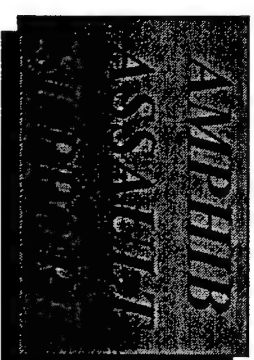
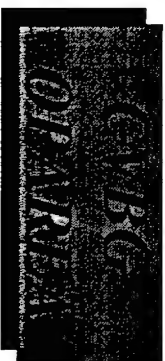
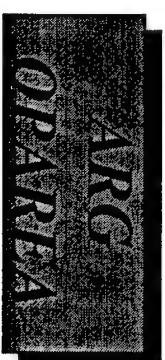
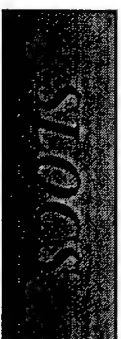
## MCM

### REQUIREMENTS



# The Challenge

- Simultaneous MCM Operations in Geographically Dispersed Areas



*Shortfall = Timely Response*

*Dedicated  
Solution = Organic  
Mix*

# The New Frontier

## 2020 and Beyond

- Concurrent Operations & Objectives Drive Future Requirements
  - Robust & Dynamic C4I (Afloat and Ashore)
  - MCS-X?, SMCM-X? and MH-X?
    - Smaller?, SWATH?, Transported within BG/ARG?
  - Compact, Lightweight Hunt/Sweep Systems with Greater Capability
  - Role of Allied MCM Forces (Compatibility?)

*Timely Application + Rapid Execution = MCM SUCCESS*



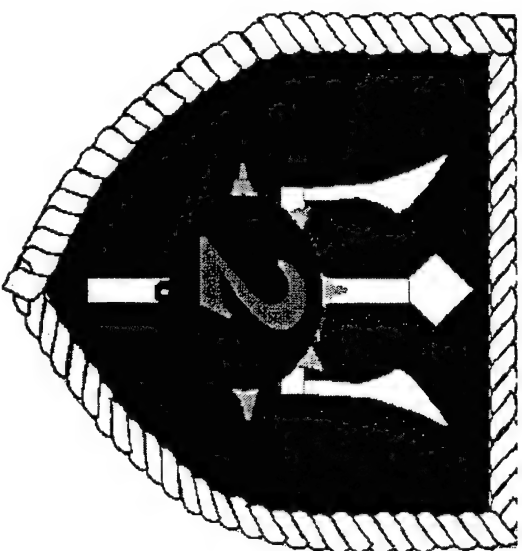




# **Dedicated Mine Countermeasures**

## **Challenges for the Government-Industry Team**

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**By**

**CAPT Buzz Broughton**

**COMCMRON TWO**

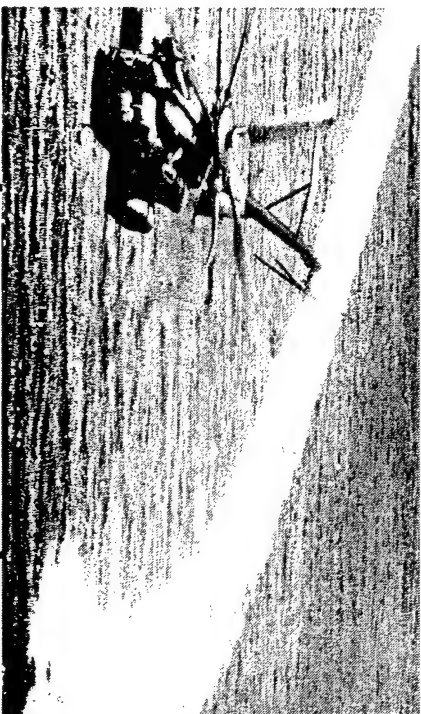
**INCHON TASK GROUP**

# DEDICATED MCM FORCES - "THE TRIAD"

## AMCM:

HM-14

HM-15



## EOD:

MCM DETS

MMS DETS

VSW DET



## MCMRON

### STAFFS

MCMRON 1

MCMRON 2

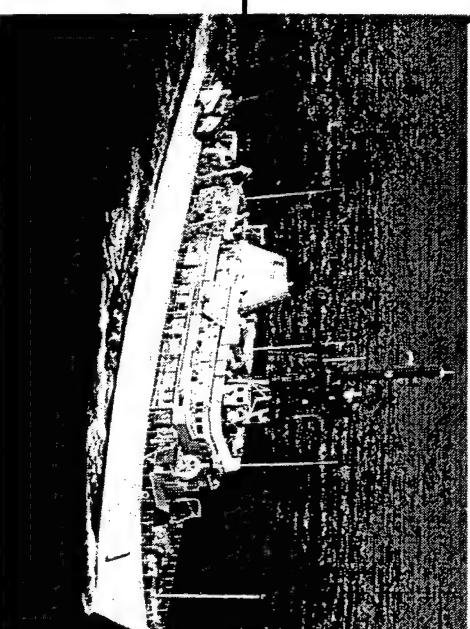
MCMRON 3

## SMCM:

MCM CLASS

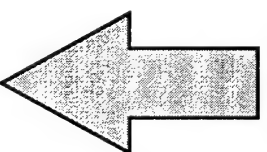
MHC CLASS

MCS 12



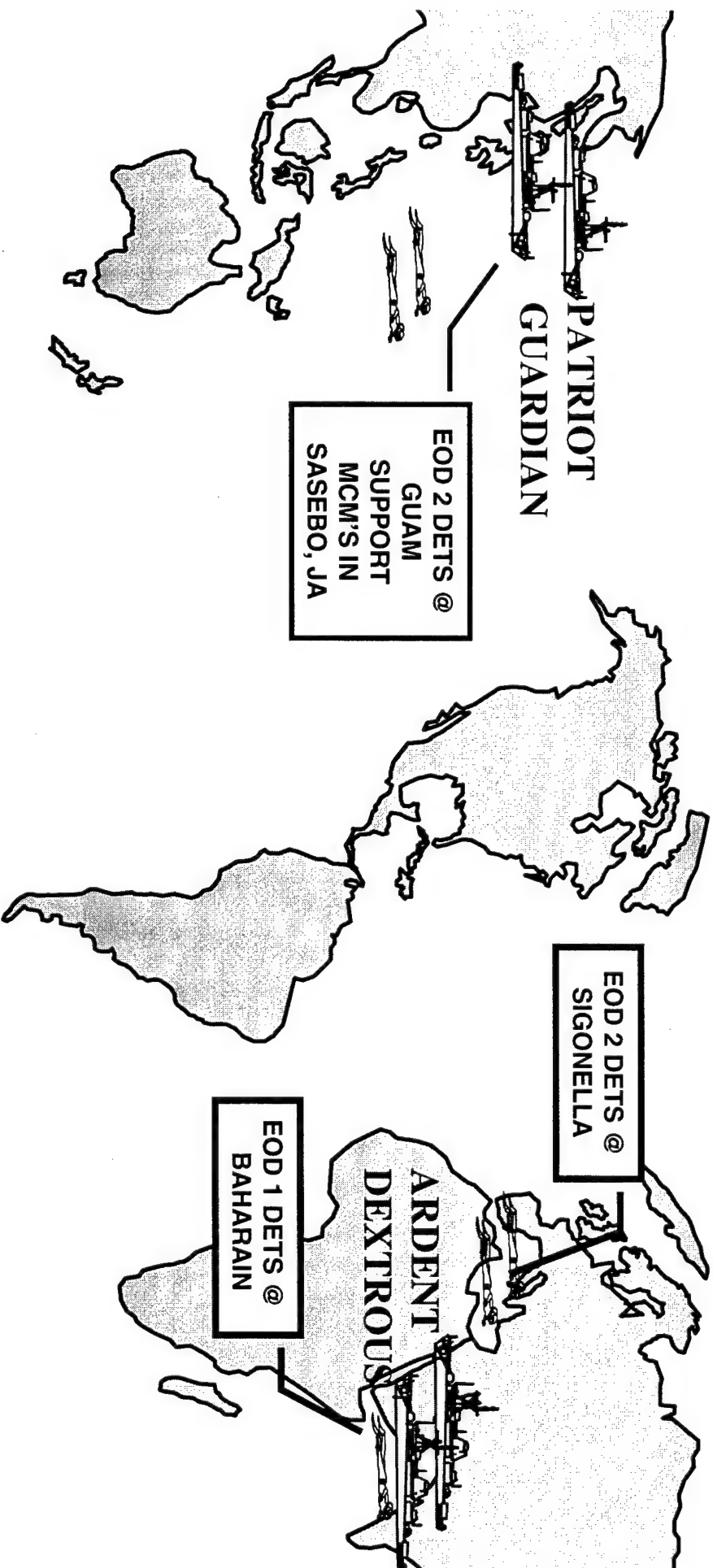
# **CRISIS RESPONSE**

- FORWARD PRESENCE
- RAPID CONTINGENCY RESPONSE
- RAPID FOLLOW-ON DEPLOYMENT

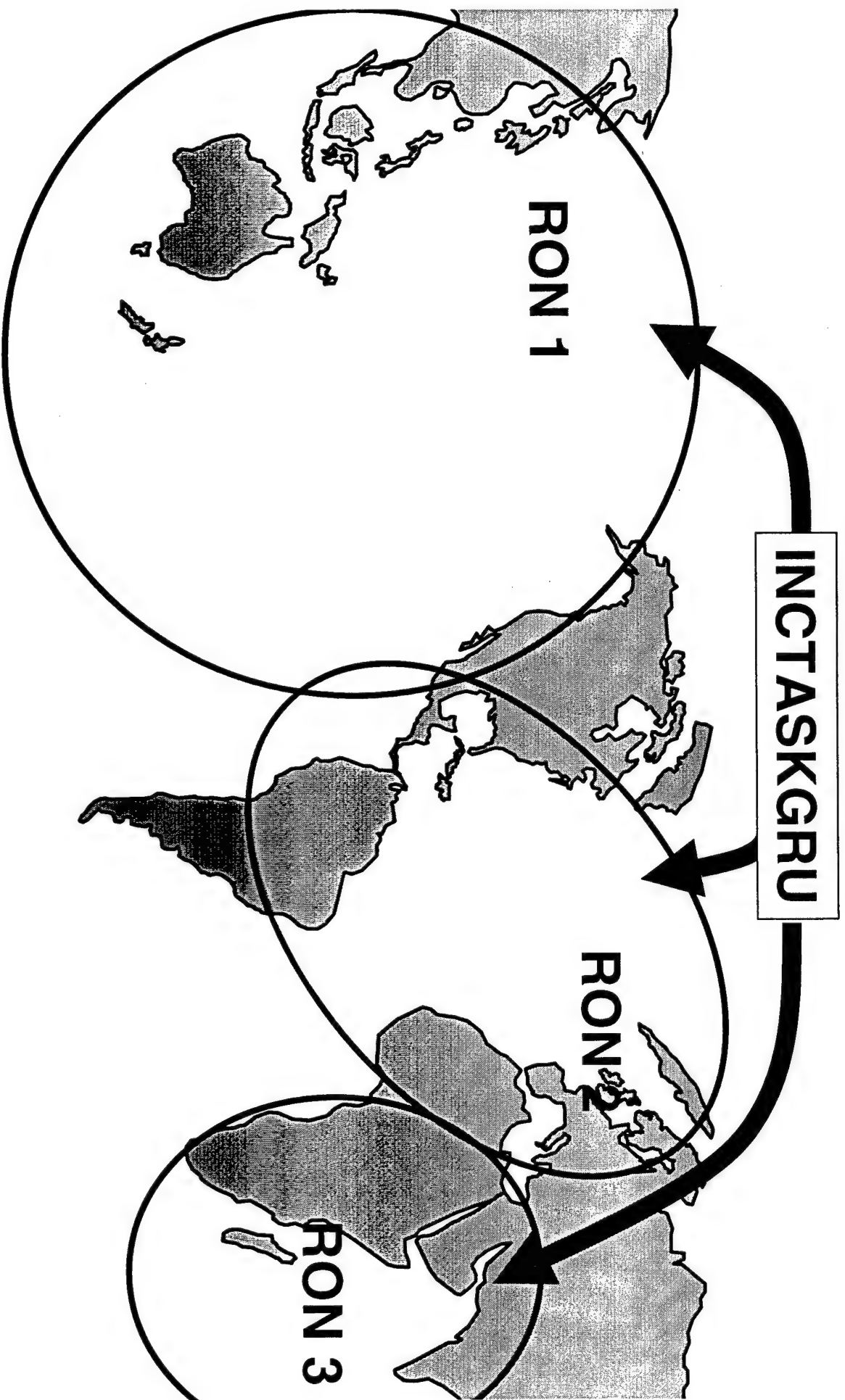


**DRIVEN BY OPERATIONAL PLANS AND  
SUPPORTED FROM SOUTH TEXAS**

# FORWARD PRESENCE THE MCM CLASS OVERSEAS

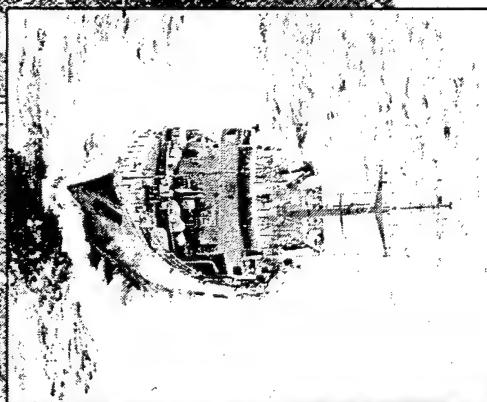


# AREAS OF RESPONSIBILITY





# INCHON TASK GROUP INTEGRATED MCM



# **MCMD DEVELOPMENT REQUIRED TECHNICAL ADVANCES**

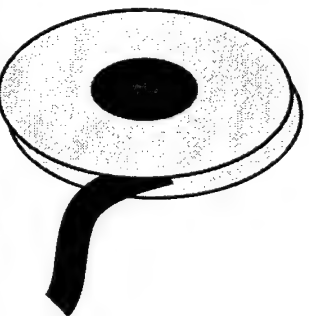
- **SPEED IS LIFE**
  - TIMELY RESPONSE
  - RAPID ENGAGEMENT
  - HOW CAN WE REDUCE TIME BETWEEN CONTACT DETECTION(BY AMCM) AND CONTACT PROSECUTION?
- **ARMED WITH DATA**
  - HOW DO WE GET THE MINE WARRIORS THE DATA THEY NEED, WHEN THEY NEED IT?

# MCM DEVELOPMENT

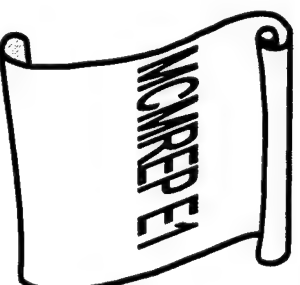
## REDUCE DETECT TO ENGAGE TIME



MISSION=3.5HR

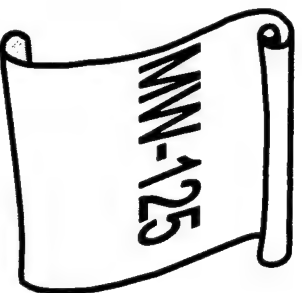


PMA=7.0HR

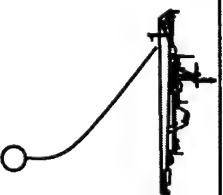


REPORT=3HR

### DETECTION AND CLASSIFICATION



TASK=3HR

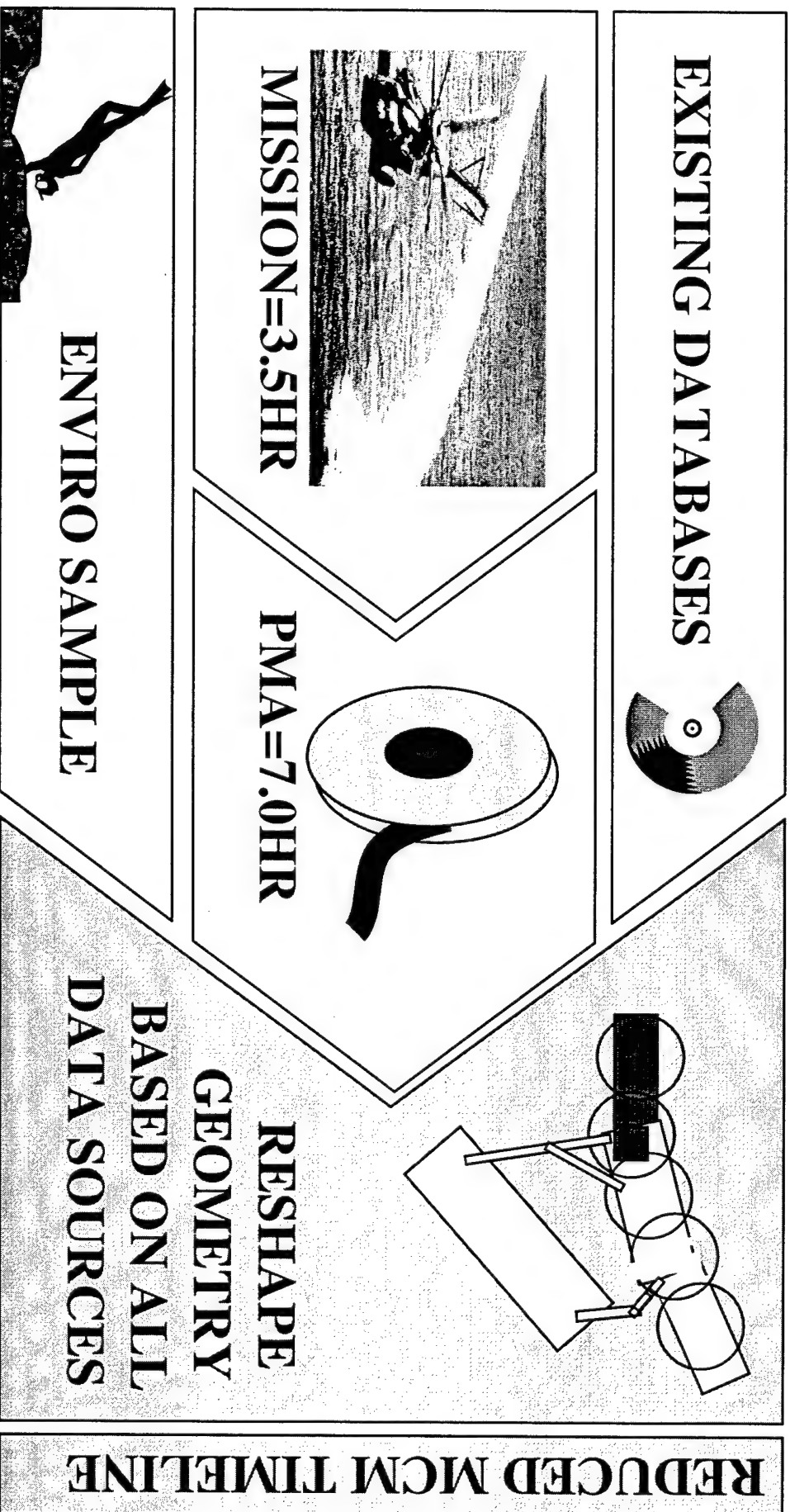


REACQUISITION, IDENTIFICATION, NEUTRALIZATION



# MCM DEVELOPMENT

*REDUCE TIME TO SHAPE BATTLE SPACE*



# **MCM DEVELOPMENT**

***REDUCE DETECT TO ENGAGE TIME***

## **• AMCM DATA LINKS**

- MISSION ANALYSIS CONCURRENT WITH MISSION.
- SAME DAY PROSECUTION BY SMCM AND UMCM ASSETS.

## **• AMCM IDENTIFICATION CAPABILITIES**

- LASER LINE SCAN/EOID
- INCREASES ACCURACY OF PMA.
- DECREASES TIME FOR THE PROSECUTION OF MINE-LIKE CONTACTS.

# **MCM DEVELOPMENT**

## ***DATA ACCESSIBILITY***

### **•CREATING MOSAICS**

- DEFINES BOTTOM TYPE**
- INCREASES EFFICIENCY / SHORTENS TIMELINES**
- DETECTS RESEEDING**

### **•ESTABLISHING DATA BASES**

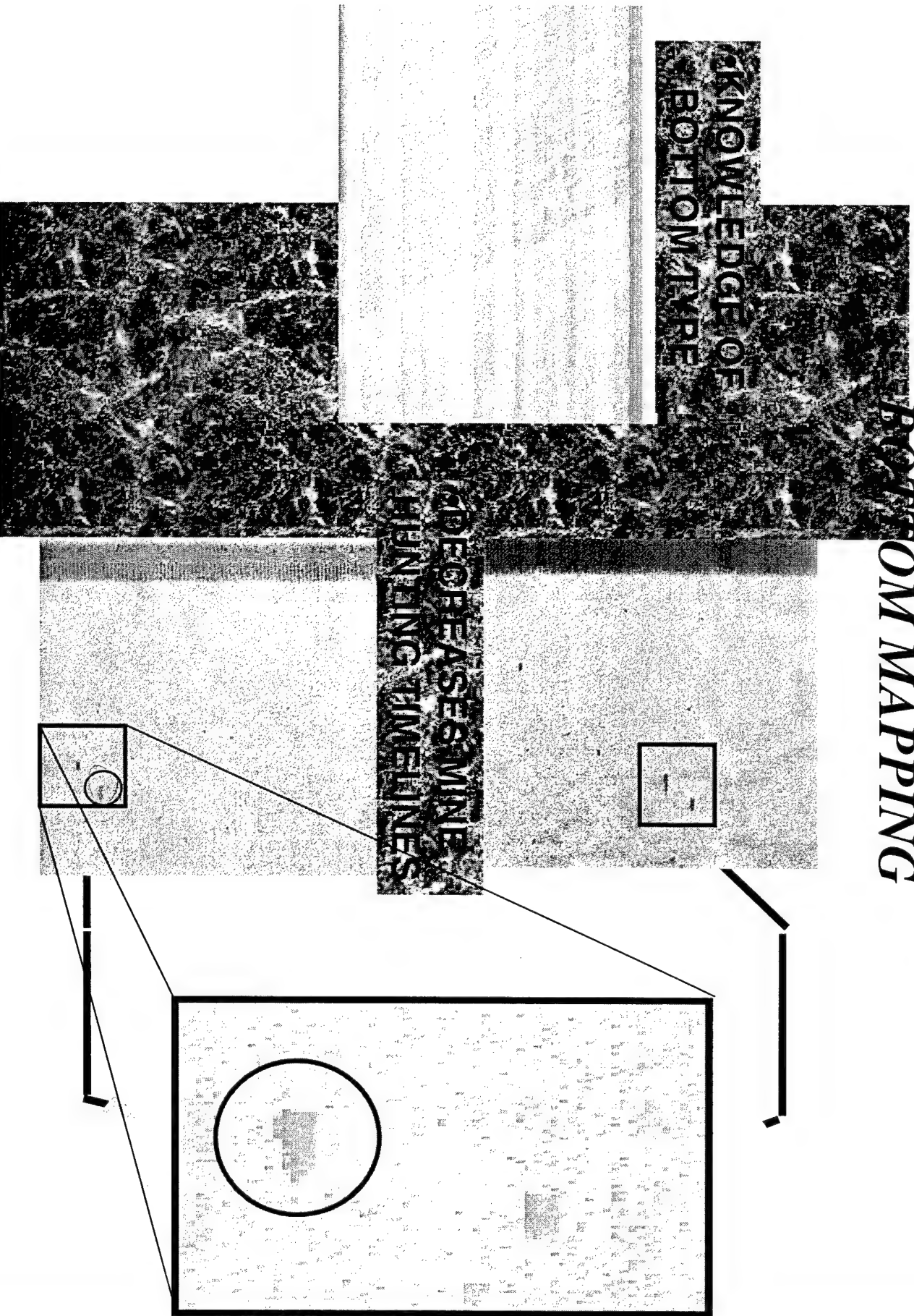
- INCREASES KNOWLEDGE OF GLOBAL OPERATING AREAS**

# MCM DEVELOPMENT

## BOTTOM MAPPING

KNOWLEDGE OF  
BOTTOM TYPE

DECREASES  
MINING TIMELINES



# INCTASKGRU 99-1



- Operational Deployment to C6F and C5F AOR's
- Objectives
  - Validate OPLANS
  - Validate Integrated Concept
  - Operate in each environment
  - Expose two Fleet CDRS to MCM TG
- Battle Experiment
  - Operate systems in environment
  - Develop/test tactics

**Daniel A. Crute**  
**Head, Littoral Warfare Analysis Branch**  
**Coastal Systems Station**  
**Panama City, Florida**

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R0898-7329

# SURF ZONE TECHNOLOGY

092

*ENABLING POWER PROJECTION FROM THE SEA*

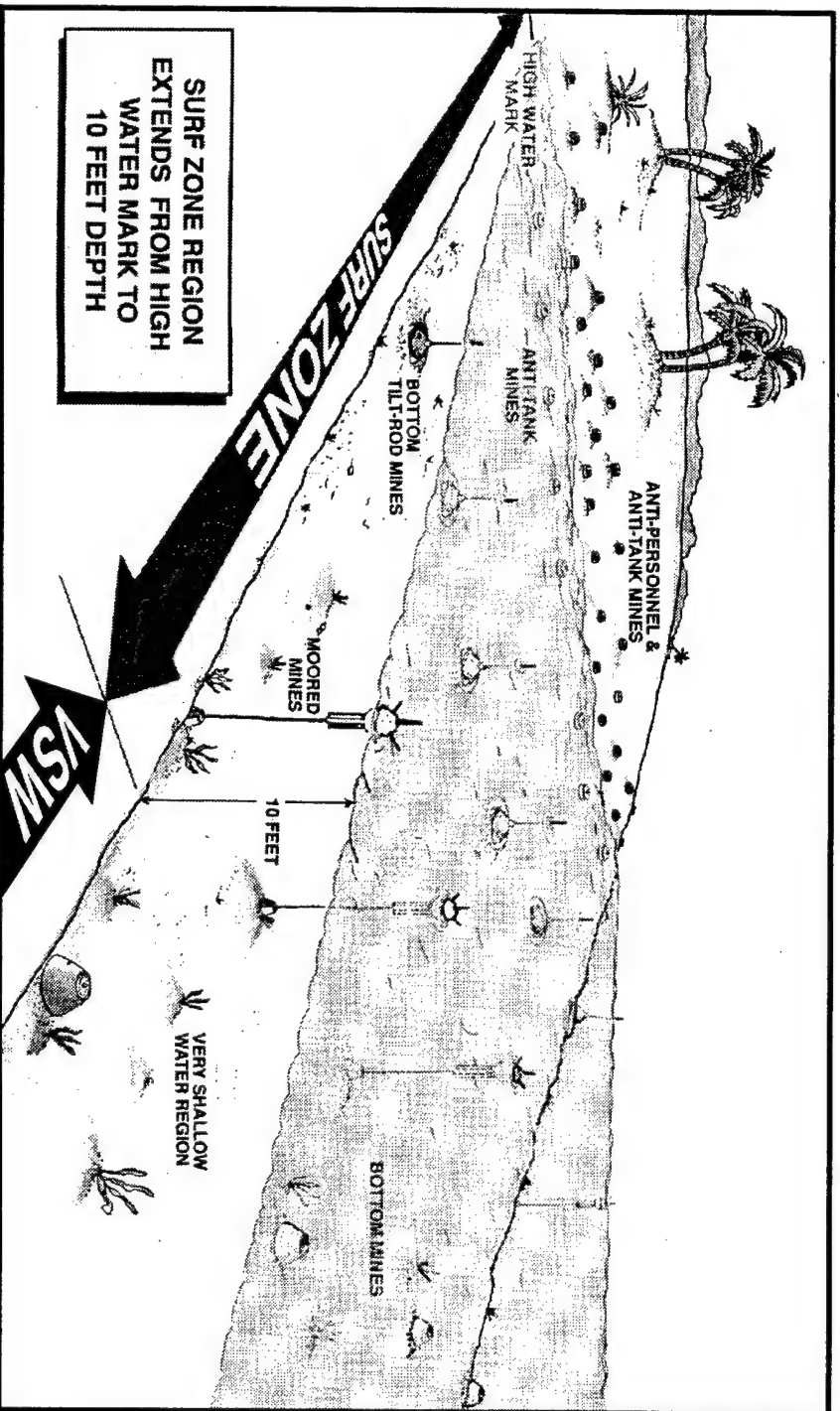


COASTAL SYSTEMS STATION - PANAMA CITY, FLORIDA





# SURF ZONE AND VERY SHALLOW WATER



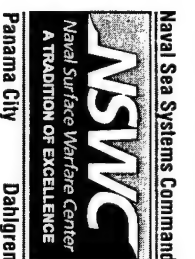
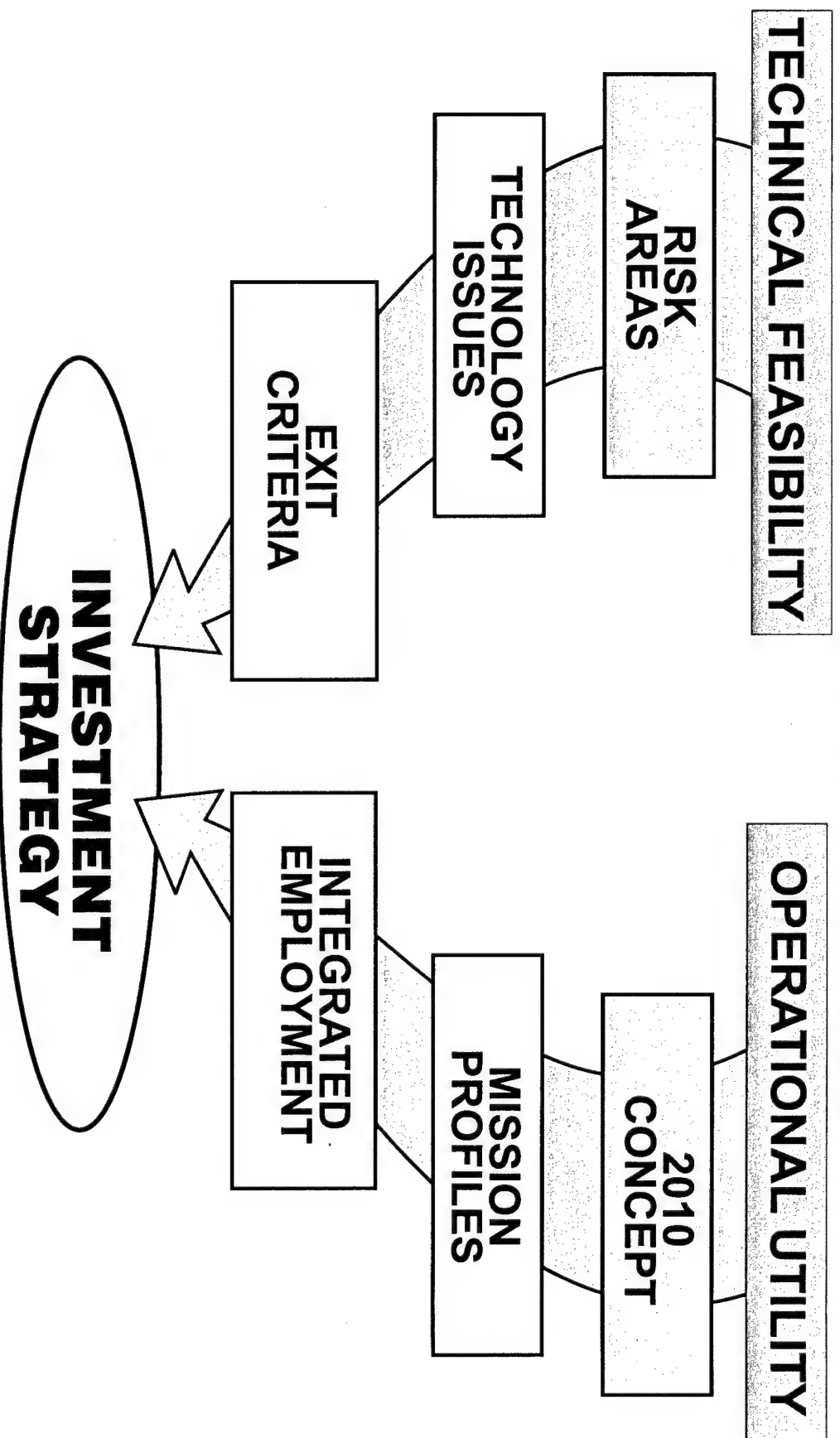
HEAVY WEIGHT OBSTACLES	
	CONCRETE CUBE • 300 LBS CONCRETE • 17 INCH DIAMETER • 17 INCH TALL
	JAGGED BARRIER • 300 LBS CONCRETE • 17 INCH DIAMETER • 17 INCH TALL
MEDIUM WEIGHT OBSTACLES	
	STEEL TRIPOD • 100 LBS STEEL • 17 INCH DIAMETER • 17 INCH TALL
	STEEL HEDGEHOG • 100 LBS STEEL • 17 INCH DIAMETER • 17 INCH TALL
LIGHT WEIGHT OBSTACLES	
	ENGINEER STAKE • 10 LBS WOOD • 17 INCH DIAMETER • 17 INCH TALL
	CONCENTRIC WIRE • 10 LBS WIRE • 17 INCH DIAMETER • 17 INCH TALL
	LOG POSTS • 10 LBS WOOD • 17 INCH DIAMETER • 17 INCH TALL





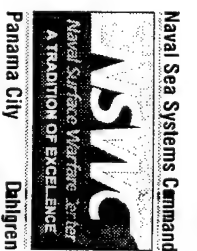
# SURF ZONE TECHNOLOGY

## CONCEPT-BASED ASSESSMENT

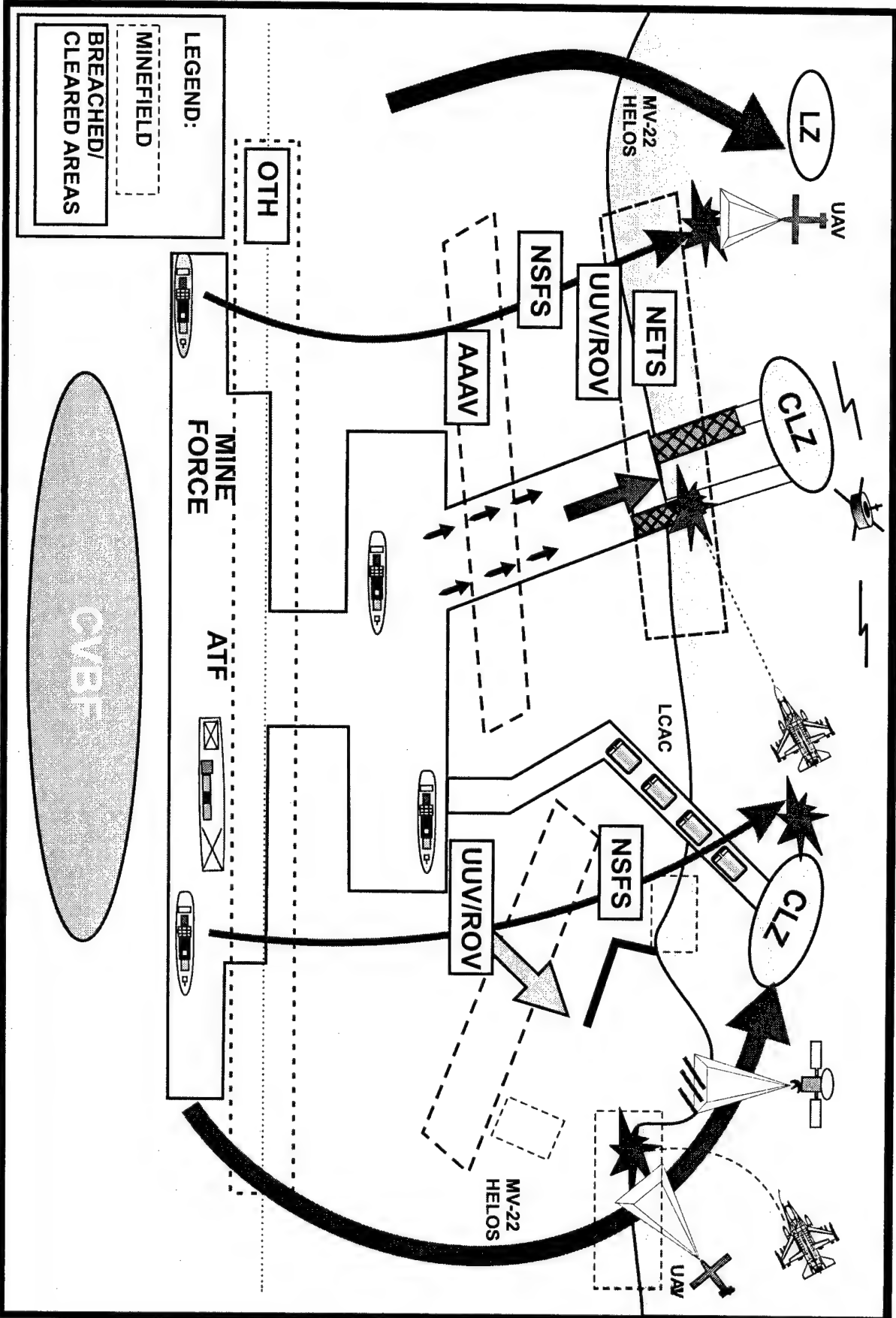




# YEAR-2010 POWER PROJECTION



0798-11290



COASTAL SYSTEMS STATION - PANAMA CITY, FLORIDA



# **SURF ZONE TECHNOLOGY MAJOR THRUSTS**



R0798-8973

## ● RECONNAISSANCE

- NETWORK OF AUTONOMOUS VEHICLES
- ENABLE EXPLOITATION OF GAPS
- MARK TARGETS AND CLEARED LANES

## ● OVER THE HORIZON DELIVERY

- RAPID, FLEXIBLE, LONG STANDOFF
- AUTONOMOUS GUIDED GLIDERS
- ELECTRONIC LANE MARKING

## ● RAPID CLEARANCE

- COMPUTATIONAL PREDICTIVE MODELS
- TARGET VULNERABILITY DATA BASE
- OPTIMIZED EXPLOSIVE EFFECTIVENESS

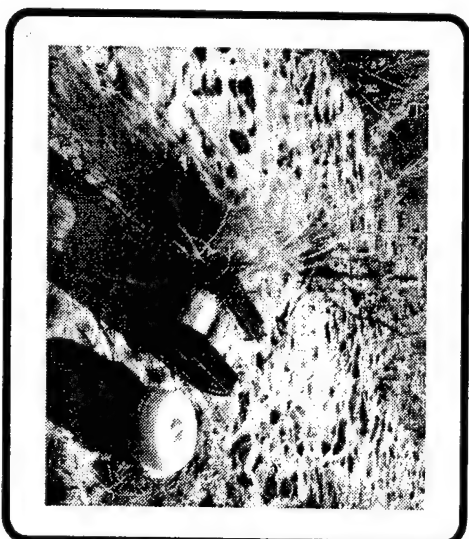
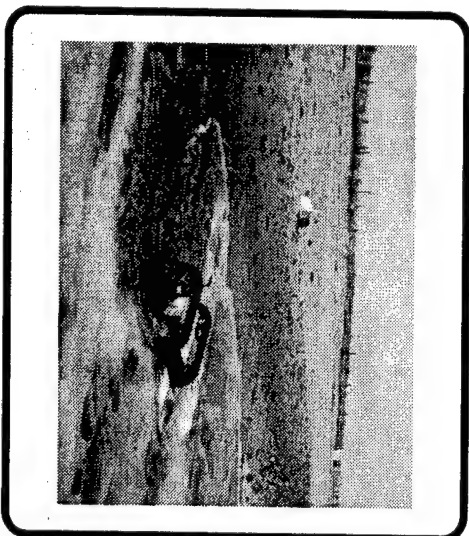
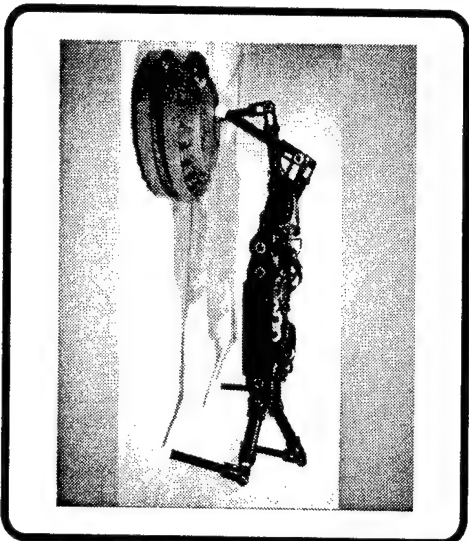


## *Surf Zone Technology*



R0798-9244

# **SURF ZONE RECONNAISSANCE**



### ● TECHNOLOGY ISSUES

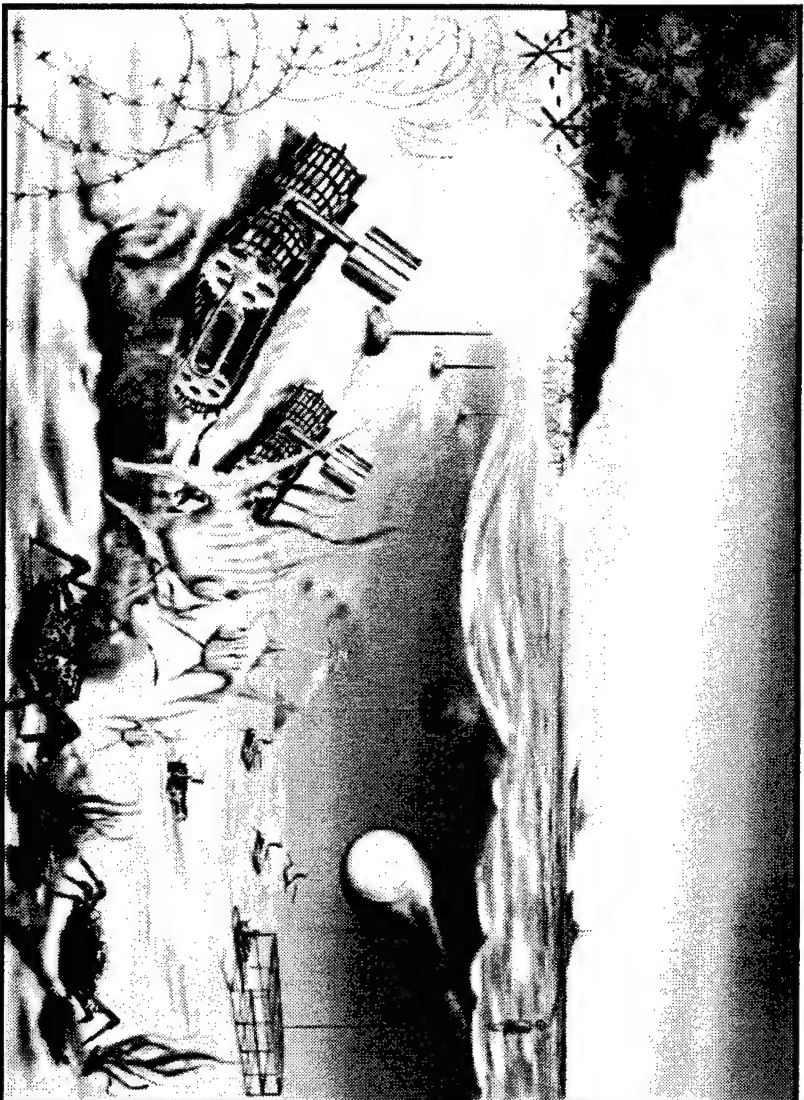
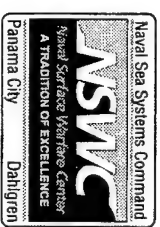
- SENSING
- NAVIGATION
- COMMUNICATION
- MOBILITY

### ● ENVIRONMENTAL CHALLENGES

- WAVES & CURRENTS
- TURBIDITY & BUBBLES
- ACOUSTIC NOISE
- CLUTTER



# AUTONOMOUS RECONNAISSANCE AND CLEARANCE



## VISION

- AUTONOMOUS OPERATIONS
- SEAMLESS THROUGH THE LITTORALS
- ENABLING OPERATIONAL MANEUVER

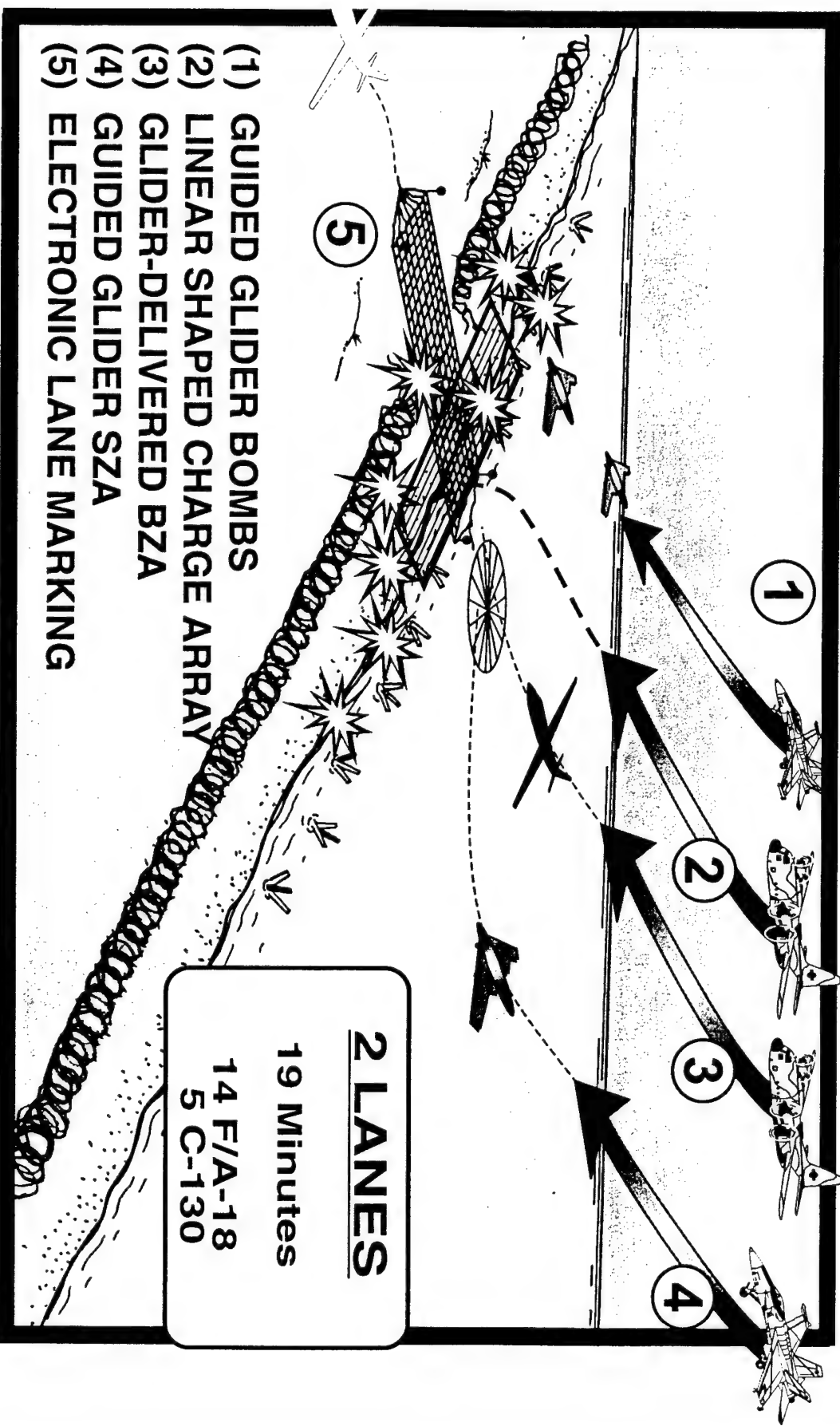
860

## KEY TECHNOLOGIES

- AUTONOMOUS CONTROL / NETWORKS
- SENSORS / FUSION / ATR
- UNDERWATER & OTH COMMS
- INFO MANAGEMENT / DATA FUSION

COASTAL SYSTEMS STATION - PANAMA CITY, FLORIDA

# OVER THE HORIZON DELIVERY



- (1) GUIDED GLIDER BOMBS
- (2) LINEAR SHAPED CHARGE ARRAY
- (3) GLIDER-DELIVERED BZA
- (4) GUIDED GLIDER SZA
- (5) ELECTRONIC LANE MARKING

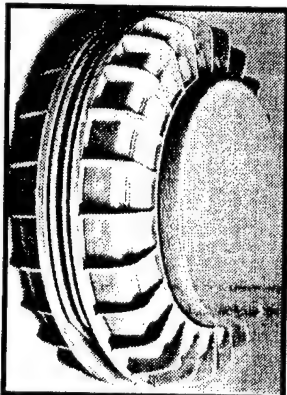
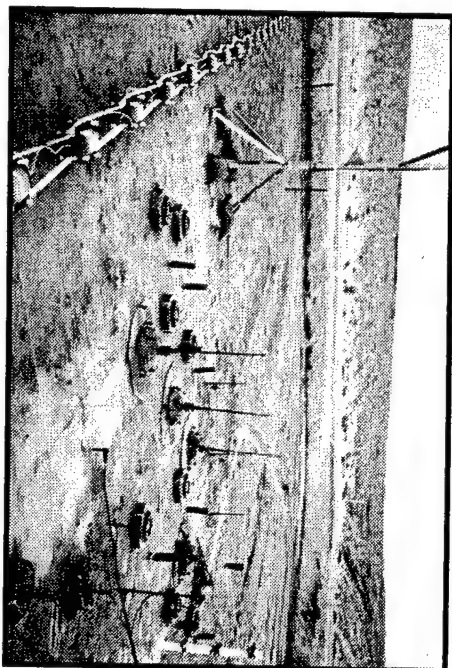
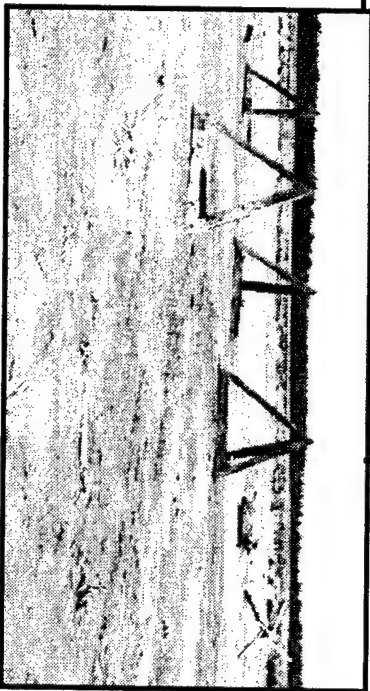
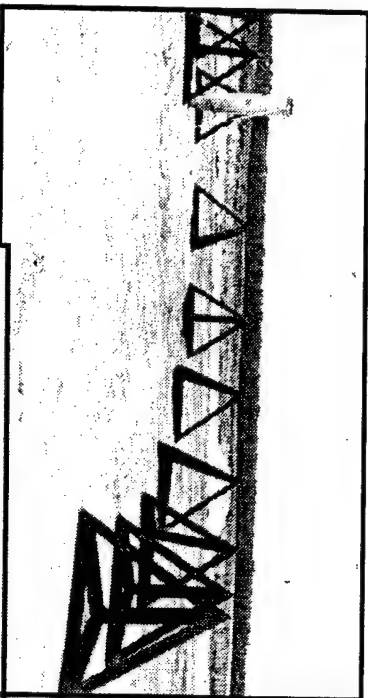
**2 LANES**  
 19 Minutes  
 14 F/A-18  
 5 C-130





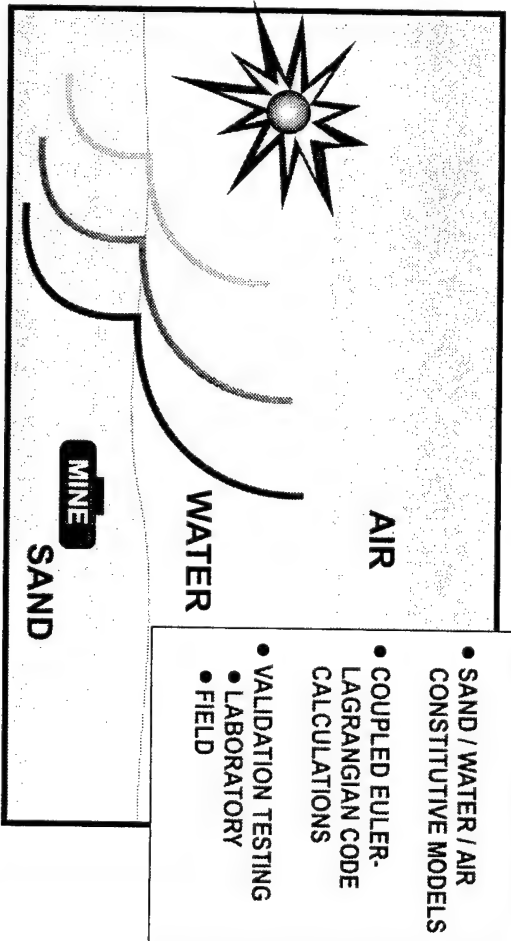
# RAPID CLEARANCE

- MINE VULNERABILITY
- EXPLOSIVE PERFORMANCE
- OBSTACLE VULNERABILITY
- BOMB EFFECTS



Naval Sea Systems Command  
**NSWC**  
 Naval Surface Warfare Center  
 A TRADITION OF EXCELLENCE  
 Panama City Dahlgren

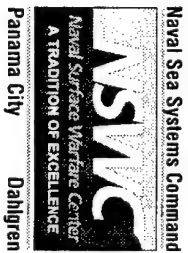
0798-11280





# TRANSITIONS AND PRODUCTS

0798-11281



## ● SZ RECON

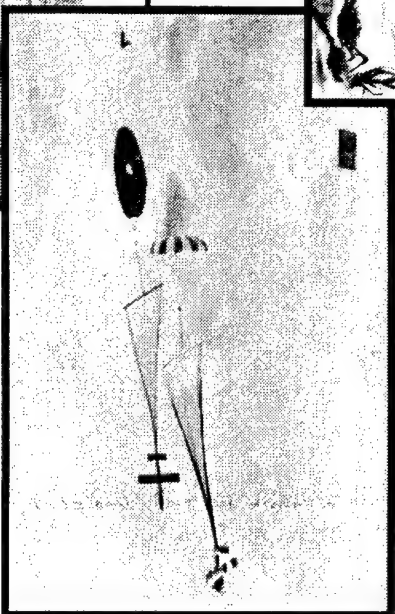
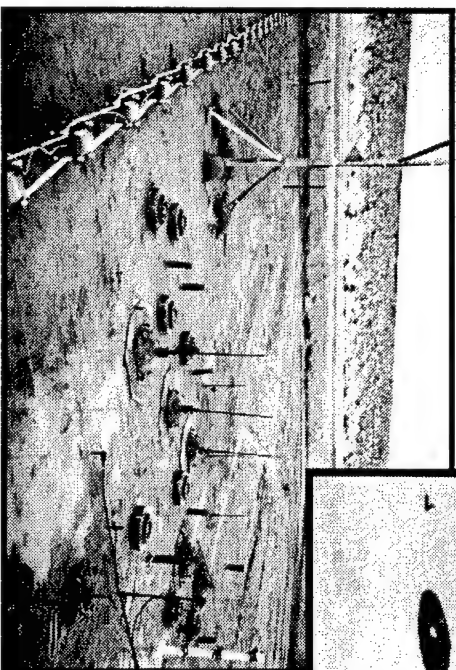
- AUTONOMOUS NETWORKS
- TO VSW / SZ (6.3)

## ● OTH DELIVERY

- MAGIC CARPET
- TO EN-ATD (6.3)

## ● RAPID CLEARANCE

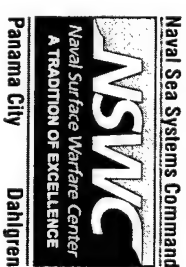
- MINE VULNERABILITY DATA
- PREDICTIVE MODELS
- TO ABS (6.4)







# SURF ZONE TECHNOLOGY ENCYCLOPEDIA



1098-11498

CLEARANCE

NEUTRALIZATION

RECONNAISSANCE

ANALYSIS

MISCELLANEOUS

SEARCH THE SZTE

## LONGSHOT STANDOFF DELIVERY

DESCRIPTION  
STRAP-ON GLIDE WING KIT

DEPLOYMENT METHOD  
AIRCRAFT DELIVERED GLIDE BOMB

CATEGORY  
NEUTRALIZATION

ADVANTAGES  
● AIR QUALIFIED  
● GOOD ACCURACY  
● MINIMAL PLATFORM RISK

DISADVANTAGES  
● SCALE-UP FOR LARGE MUNITIONS  
● DUPLICATE EFFORT (JSOW)



SPONSOR  
TOM SWEAN (703) 696-4025

POC  
NEIL LEVY (760) 930-4060

STATUS  
PREVIOUSLY FUNDED

RELATED PROGRAMS  
STANDOFF DELIVERY  
JSOW  
DEPLOYABLE WING



# **SURF ZONE TEAM**



R1098-11283

## **CURRENT 6.2 EFFORTS**

### **GOVERNMENT**

- NSWC / CSS
- NSWC / IHD
- NPS
- NRL
- AFRL / EGLIN AFB
- ARL
- SANDIA

### **INDUSTRY**

- FOSTER-MILLER
- IS ROBOTICS
- LEIGH AEROSYSTEMS
- LOCKHEED-MARTIN
- BOEING
- SRI INTERNATIONAL
- LOGICON-SYSCON
- ATR

### **UNIVERSITY**

- U OF MARYLAND
- U OF FLORIDA
- M-I SYSTEMS
- DATASONICS



## POTENTIAL

# CONTINUUM OF CAPABILITY



A0898-8125

- YEAR 2000
  - SABRE, DET, AND BOMBS
  - VSW DETACHMENT

- YEAR 2005
  - EN-P<sup>3</sup>I

- YEAR 2010
  - IN-STRIDE CLEARANCE FROM OTH

*One major catalyst of change is the advancement of technology*  
*-- Warfighting (FMFM-1)*



0798-11295

# SURF ZONE TECHNOLOGY

- *TOUGH CHALLENGE*
  - TRANSITIONAL REGION
  - CONCENTRATED THREAT
- *PROMISING TECHNOLOGIES*
  - AUTONOMOUS RECONNAISSANCE
  - OVER THE HORIZON DELIVERY
  - RAPID CLEARANCE
- *HIGH PAYOFF POTENTIAL*
  - "MAN OUT OF THE MINEFIELD"
  - ENABLE OPERATIONAL MANEUVER

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# Marine Corps Warfighting Concepts for the 21st Century



LtCol James Derdeyn  
Concepts Division  
Marine Corps Combat Development Command





# CONCEPT OF THE MILITARY

One reason the Armed Services have trouble operating jointly is that they don't speak the same language. For example:

If you told the NAVY to "secure" a building, they would turn off the lights and lock the doors.

The ARMY would occupy the building so no one could leave or enter.

The MARINES would assault the building, capture, then defend it with suppressive fires and close combat.

The AIR FORCE, on the other, would take out a three year lease with an option to buy.



# **MARINE CORPS CONCEPTS**

“...Broad statements of how the Marine Corps envisions operation in the future, WITHOUT describing specifically how this is to be achieved.”

- Focuses on WHAT, not HOW
- BASIS determining requirements
- ENTRY POINT for future ROCs





# WARFIGHTING CONCEPTS

## Operational Maneuver from the Sea (OMFTS)

Comprehensive Command & Coordination of the MAGTF

MPF  
2010

Sustained  
Ops Ashore

Ship to Objective  
Maneuver

Advanced  
Expeditionary Fires

Military Ops in  
Urbanized Terrain

Military Ops in a  
Riverine Environment

MAGTF  
Aviation

Information  
Operations

Antiarmor  
Operations

Force Protection

Other Expeditionary Operations

Mine Counter-Measures

Seabased Logistics



# FOUNDATIONS

- National Military Strategy
- ...From the Sea / Forward... From the Sea
- Joint Vision 2010
- Commandant's Planning Guidance
- Future Vision: Asymmetrical Threats
  - Chaos in the Littorals
  - Regional Powers
  - Peer Competitor



# **ROLE OF NAVAL FORCES**

**...The primary purpose of Forward-Deployed Naval Forces is to project American power from the sea to influence events ashore in the littoral regions of the world across the operational spectrum of peace, crises, and war."**

**Forward...from the Sea:**

**The Naval Operational Concept.**

**March 1997**



# CONCEPTUAL FRAMEWORK

- Operational Maneuver Warfare from the Sea (OMFTS)
- Ship to Objective Maneuver (SOM)
- Sustained Operations Ashore (SOA)
- Beyond C2
- MPF 2010 and Beyond





# MANEUVER WARFARE

Maneuver Warfare is the warfighting philosophy that seeks to shatter the enemy's cohesion through a variety of unexpected actions which create a turbulent and rapidly deteriorating situation with which the enemy cannot cope.

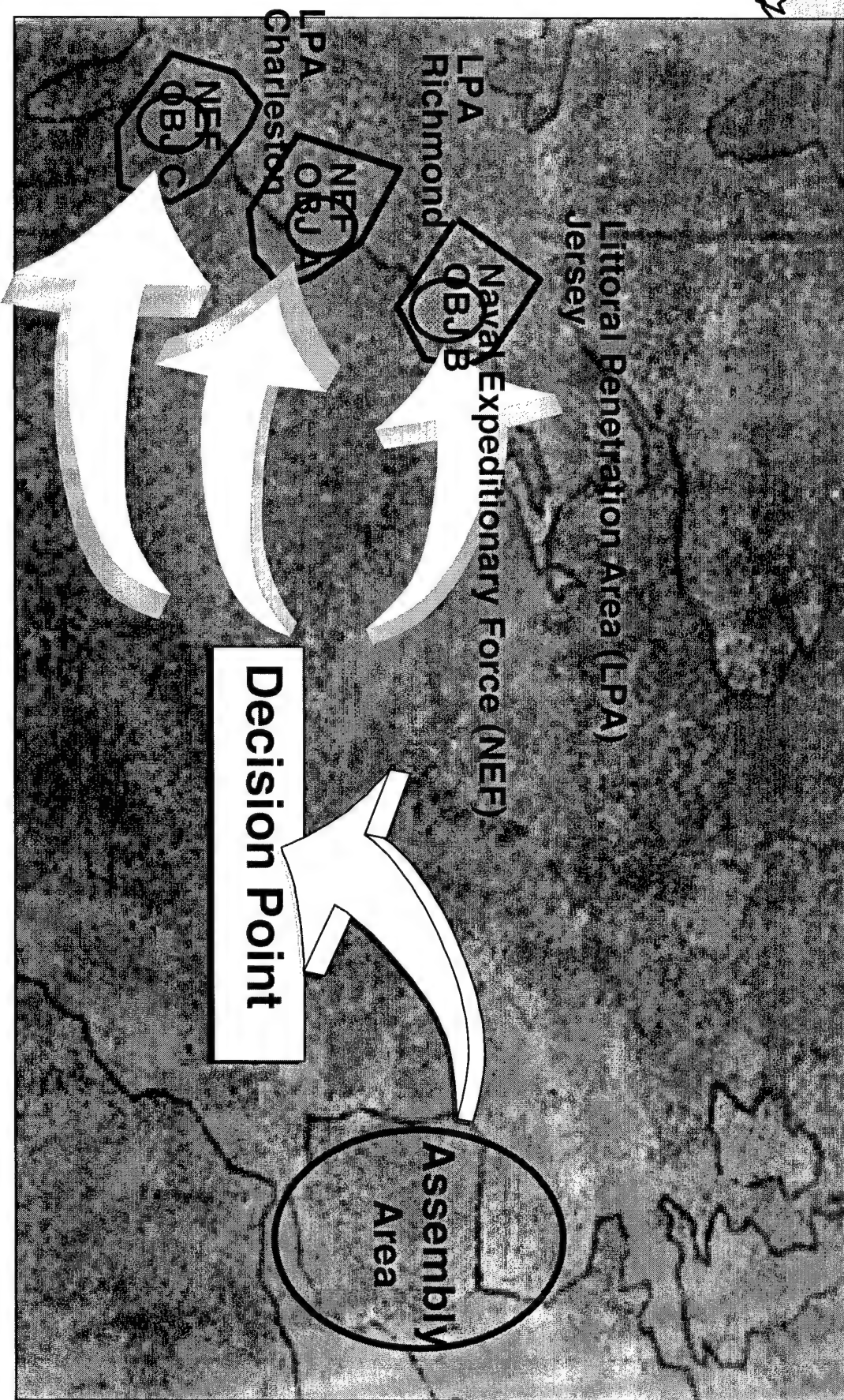


# TENETS OF OMFTS

- Focus on Operational Objective
- Use the Sea as Maneuver Space
- Emphasize Intelligence, Deception, and Flexibility
- Pit Strength Against Weakness
- Generate Overwhelming Tempo and Momentum
- Integrate Organic, Joint, and Combined Assets



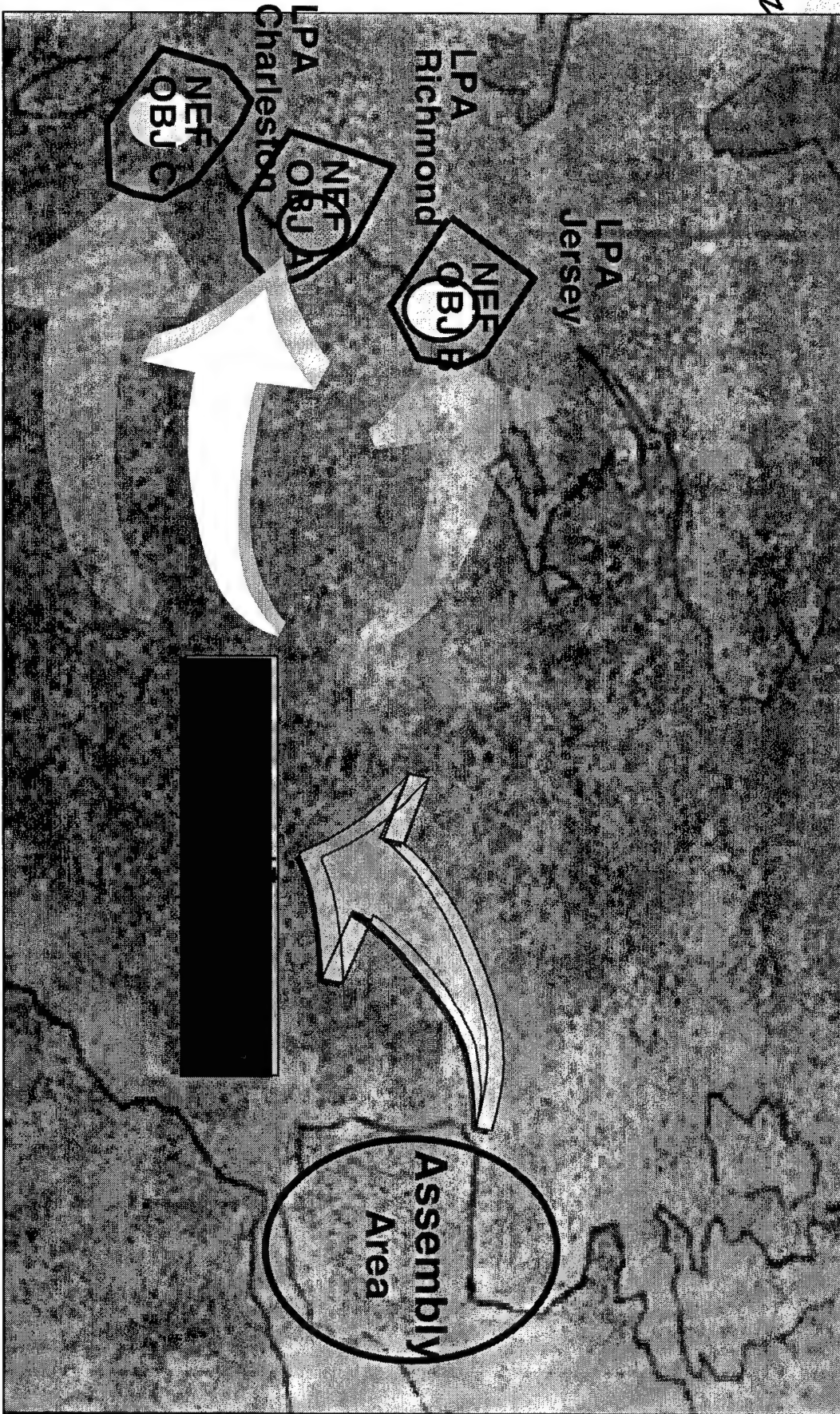
# COMFET: THE VISION







# COMFET: THE VISION





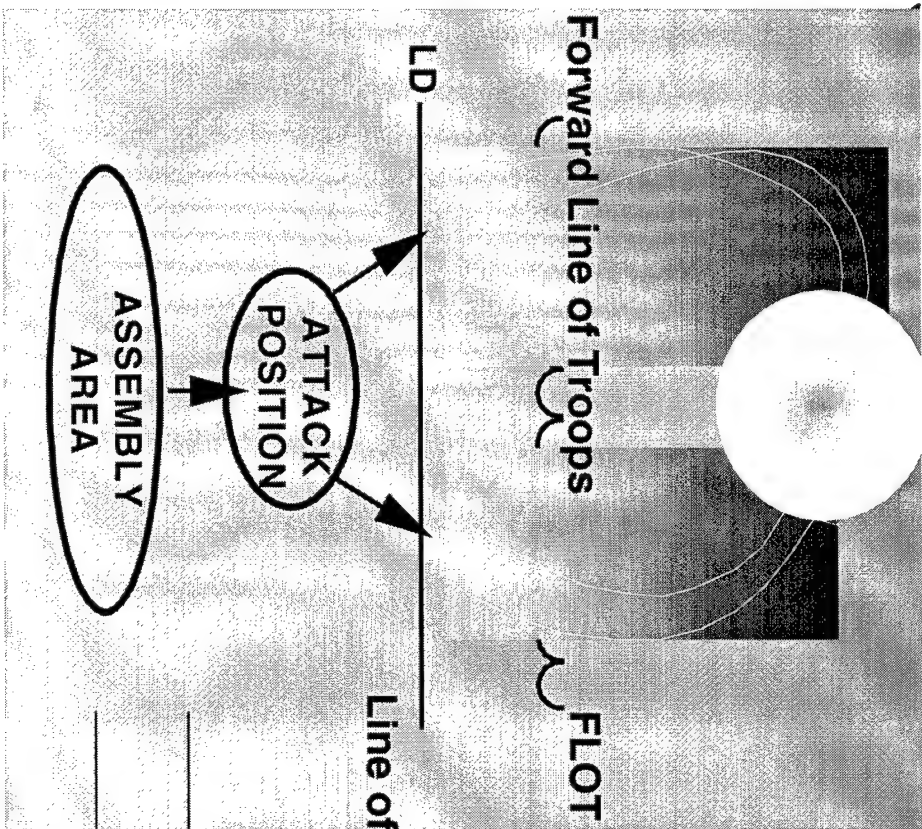


# OMFTS:

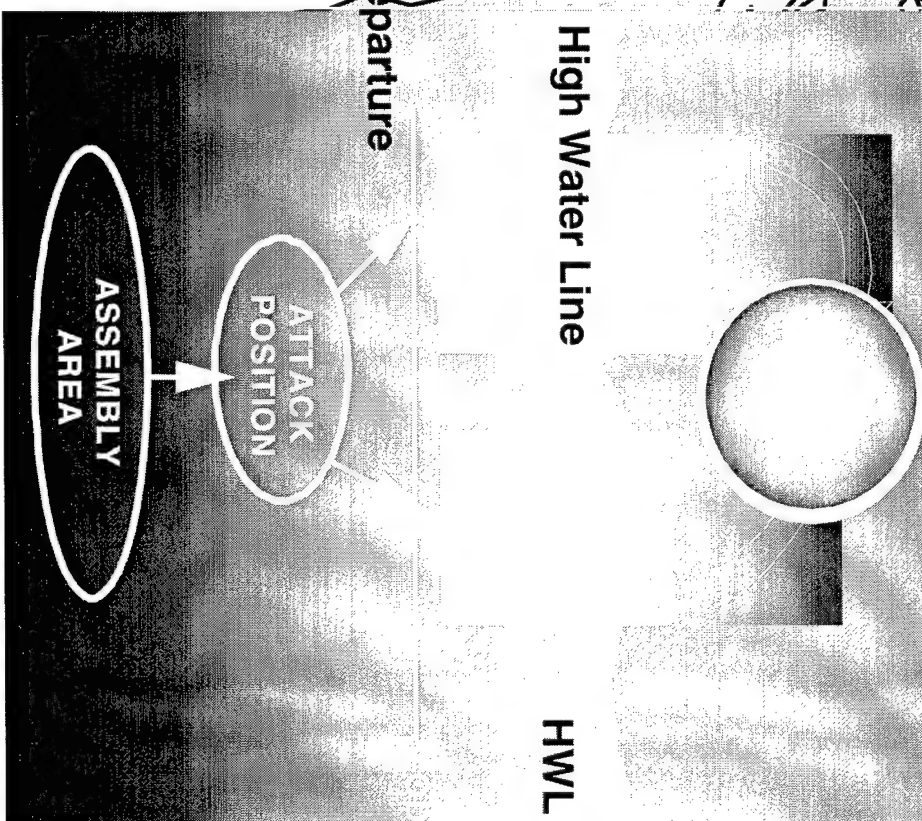
## APPLICATION OF MANEUVER

### MANEUVER ARE TO MARITIME OPERATIONS

#### LAND MANEUVER



#### MANEUVER FROM THE SEA





# SHIP TO OBJECTIVE MANEUVER (STOM)

- Dilute the enemy by enlarging the battlespace
- Create combined arms maneuver
- Control tempo / overwhelm adversary
- Control vital area by fighting outside it
- Maneuver to cause an exploitable reaction

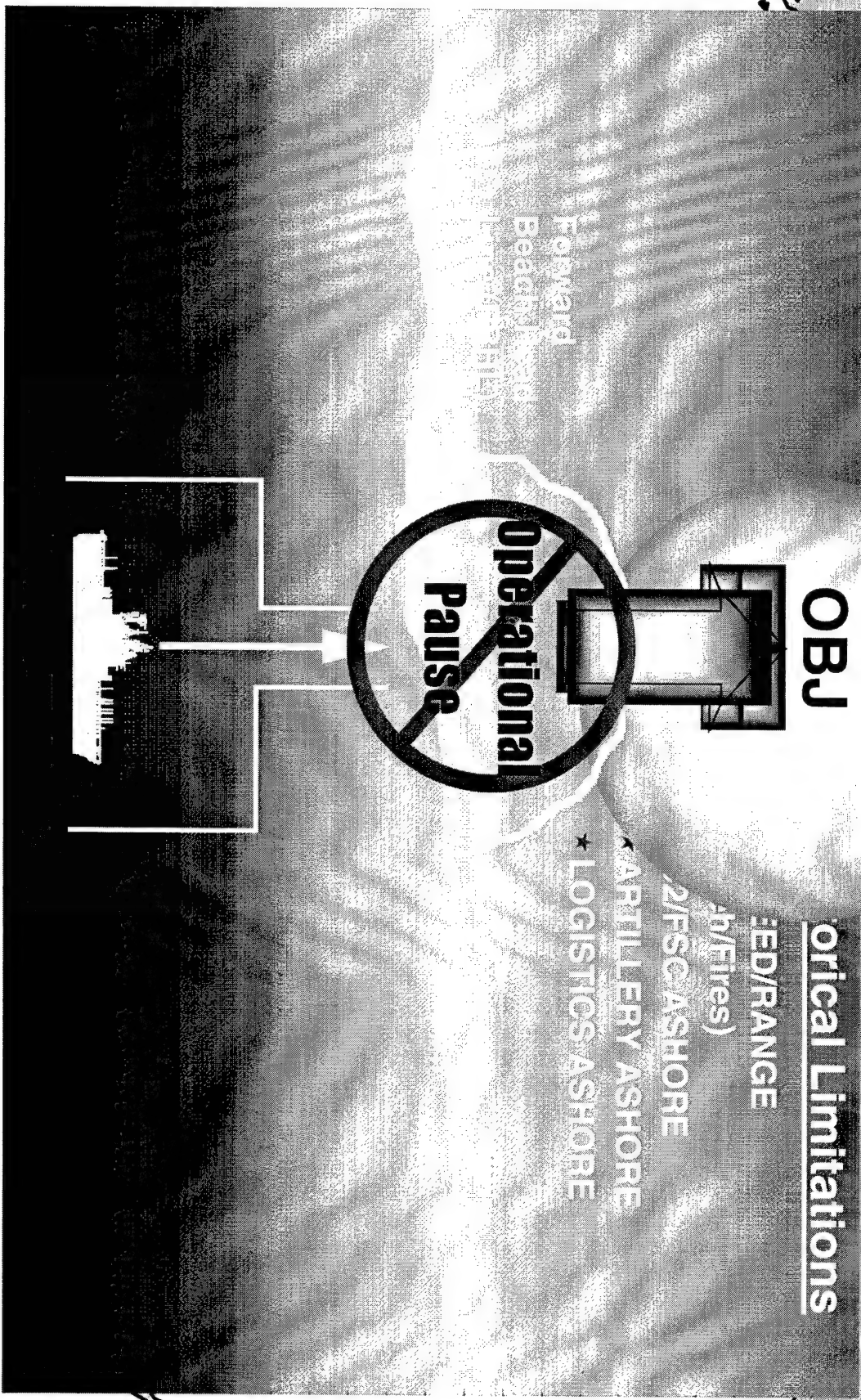


# SHIP TO OBJECTIVE MANEUVER (STOM) cont'd

OBJ

Operational Limitations

- IED/RANGE
- h/Fires)
- 2/FSC ASHORE
- ARTILLERY ASHORE
- LOGISTICS ASHORE









# **SUSTAINED OPERATIONS ASHORE (SOA)**

- Nothing new to Marines
- Looking to a different kind of battlespace
- Non-linear
- Centers of Gravity



# SUSTAINED OPERATIONS

## ASHORE (SOA) cont'd

- **Seabased: ...precise, focused**
- ...vice continuous ground ops.
- Reduced footprint ashore
- Reduced strategic lift
- **Combined Arms Team (w/ Navy)**
- Enabling Force
- Decisive Force
- Exploitation Force





## **BEYOND C2**

- **Command and Coordination across non-linear battlespace**
- **Enhances Flexibility, Mobility, Tempo, and Force Protection**
- **“Reach-back”**
- **Strategic, Operational, Tactical Awareness**



# Maritime Prepositioned Force (MPF) 2010 and Beyond

- Leases on current MPF expire early 21st Century
- OMFTS and STOM
  - Operational maneuver, footprint reduction, sea based operations
- Ports / airfields big, fixed targets
  - Pier space / offload time requirement
- Combatants Over the Horizon
  - Pier-side / "in stream for MPF?"
  - Need for a new MPF capability





# **MPF 2010 AND BEYOND**

**Fundamental Character Unchanged...  
Capabilities Expanded to Over-the-  
Horizon:**

- **Force Closure**
- **Amphibious Task Force Integration**
- **Indefinite Sustainment**
- **Reconstitution and Redeployment**
- **Protect the Force**



# FORCE CLOSURE

**Follow-On  
Echelon (FOE)  
Deploys**

**MPF**

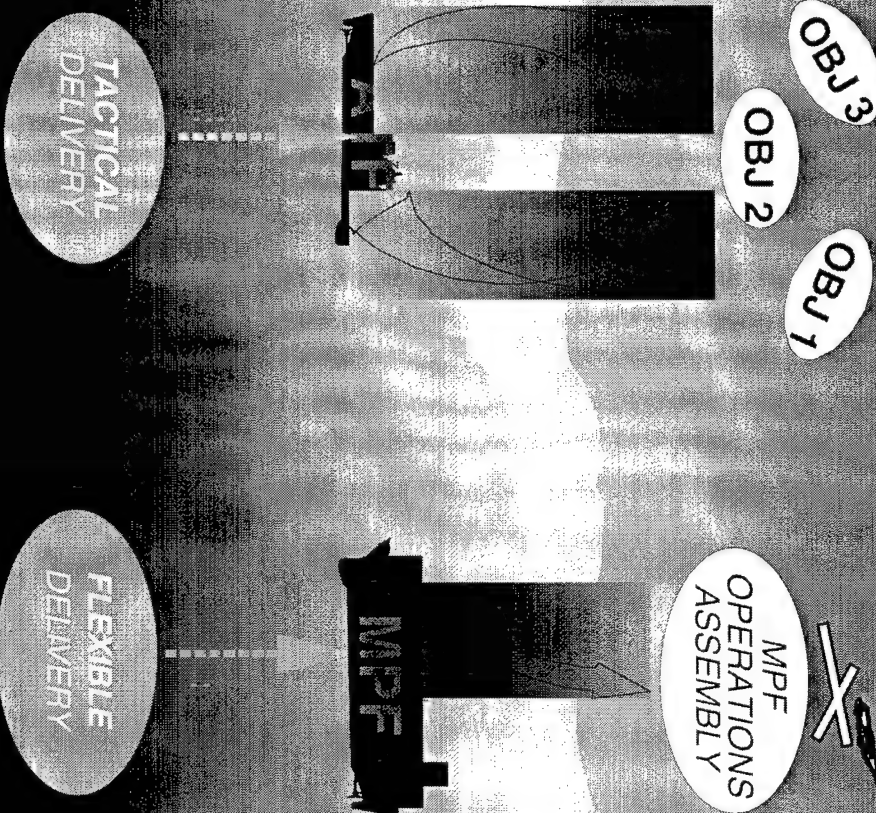
**Amphibious  
Task Force**

**MPS Squadron  
Deploys**

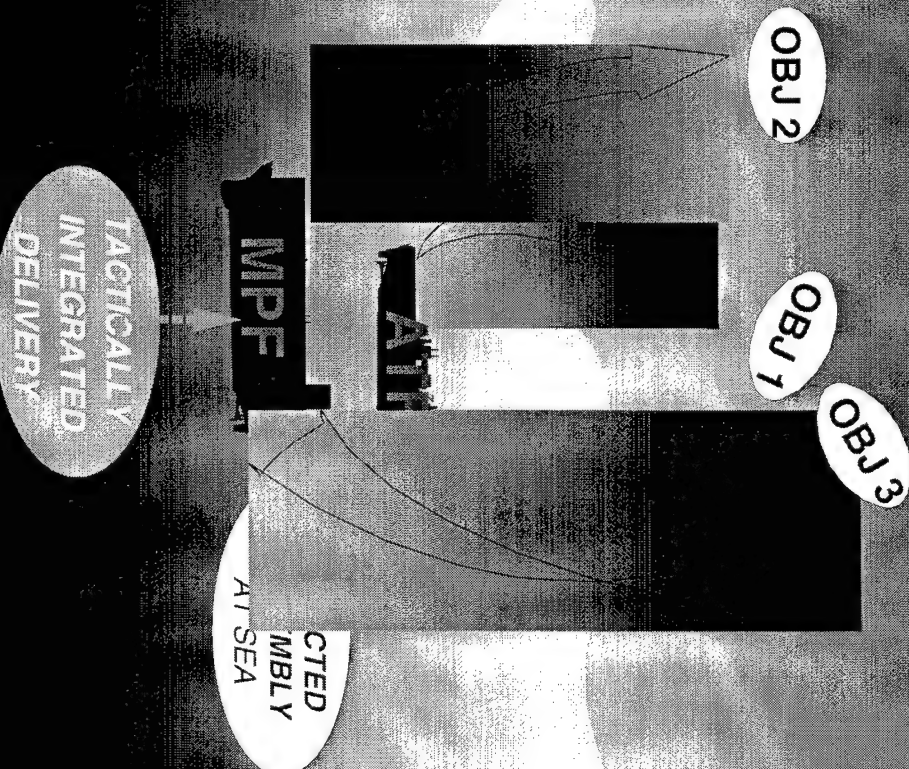


# TACTICAL INTEGRATION

## CURRENT FORCE DELIVERY



## FUTURE FORCE DELIVERY







# INDEFINITE SUSTAINMENT

Sustainment  
Conduit

OBJ

ATF

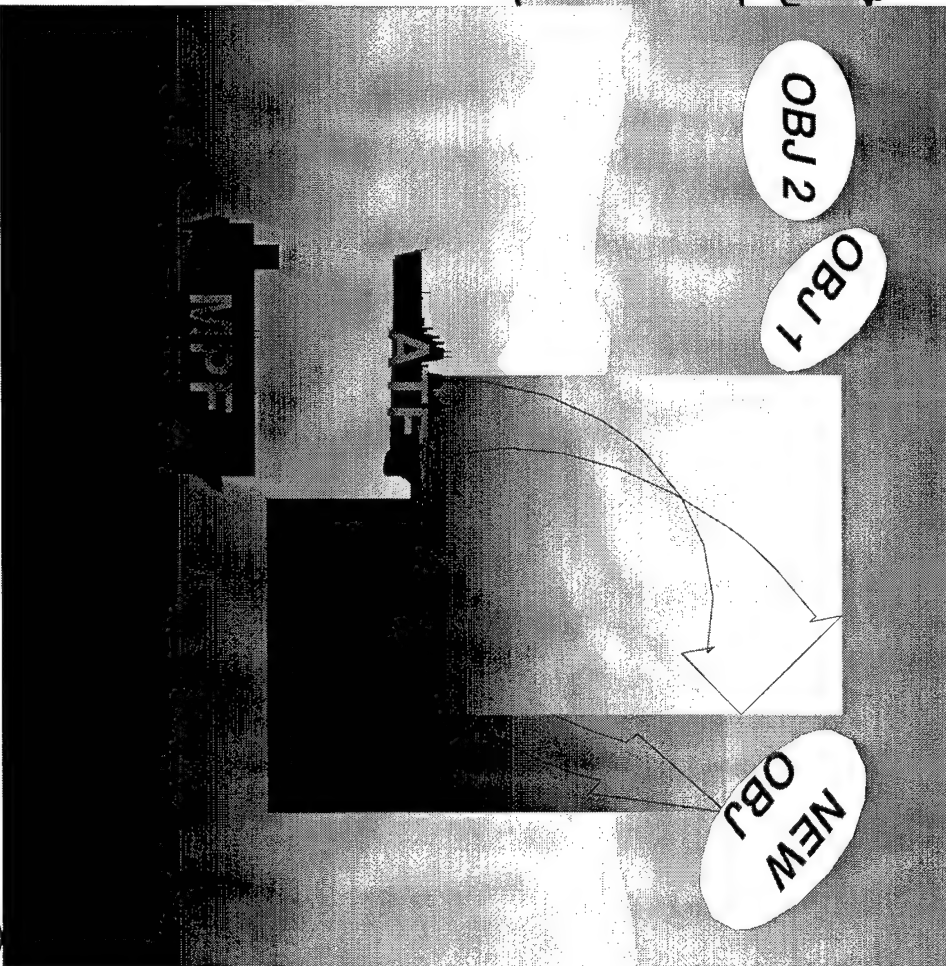
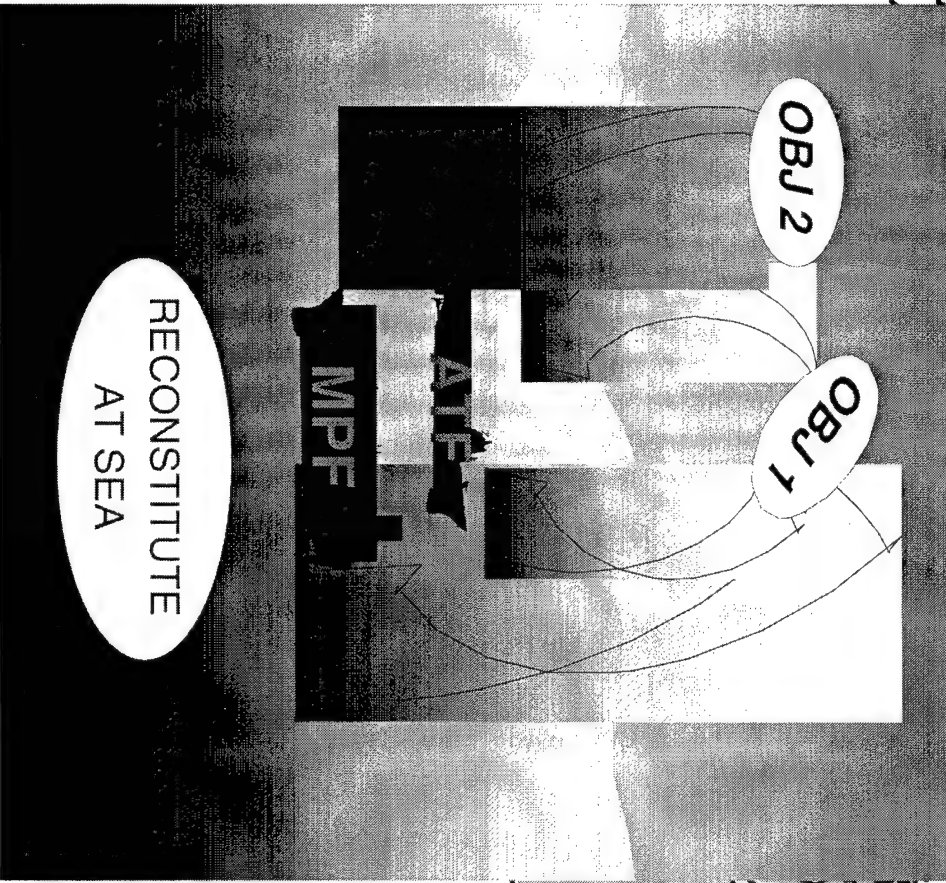
MPF



# RECONSTITUTION & REDEPLOYMENT

RECONSTITUTION

REDEPLOYMENT





# **NEW CAPABILITIES**

- **Fast Deployment**
- **At Sea Integration**
- **Reinforcement**
- **Sustained Sea Basing**
- **Reconstitution in Theater**





# CHALLENGES

- Command, Control & Coordination
- Sealift
- Vulnerability
- Fires
- Logistics



# **MARINE CORPS CONCEPTS**

“...Broad statements of how the Marine Corps envisions operation in the future, WITHOUT describing specifically how this is to be achieved.”

- Focuses on WHAT, not HOW
- BASIS determining requirements
- ENTRY POINT for future ROCs



# ...STATUS

**MV-22**

**LPD-17**

**LHD (8)**

**AAAV**

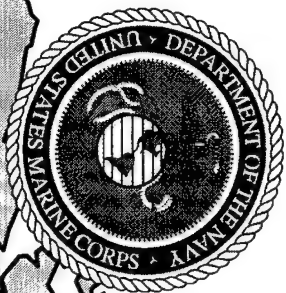
**MPF**

**2010**

**JSF**

**DD-21**

**LCAC**  
**SLEP+**



# Marine Corps Warfighting Concepts for the 21st Century

LtCol James Derdeyn

Concepts Division, MCCDC

3300 Russell Road

Quantico, VA 22134-5021

[www.concepts.quantico.usmc.mil](http://www.concepts.quantico.usmc.mil)

[derdeynje@quantico.usmc.mil](mailto:derdeynje@quantico.usmc.mil)

703-784-6243

FAX: x- 3265

DSN: 278-6243







# *Mine Warfare ...*

## *A Technology Challenge*



*NDIA Expeditionary Warfare Conference  
3 November 1998*



## MIW S&T Future Directions

---

- Smaller/Cheaper/Good Enough
  - Increased bandwidth, automatic processing, data fusion
- Multiple remote vehicles and behaviors
  - AUVs, UAVs, UMWs
- Adaptive sensors and systems for optimal performance
  - Environmental adaptability
  - Re-configurable
- Increased focus on reducing “total ownership” cost
  - Early Industry Involvement
- Continued focus on risk mitigation to acquisition





# VSW/SZ Reconnaissance

## Near Term

Insertion of Combat Swimmer Technologies  
into 6.4 Programs



## Mid Term

Insertion of UAV Technologies  
into 6.4 Programs



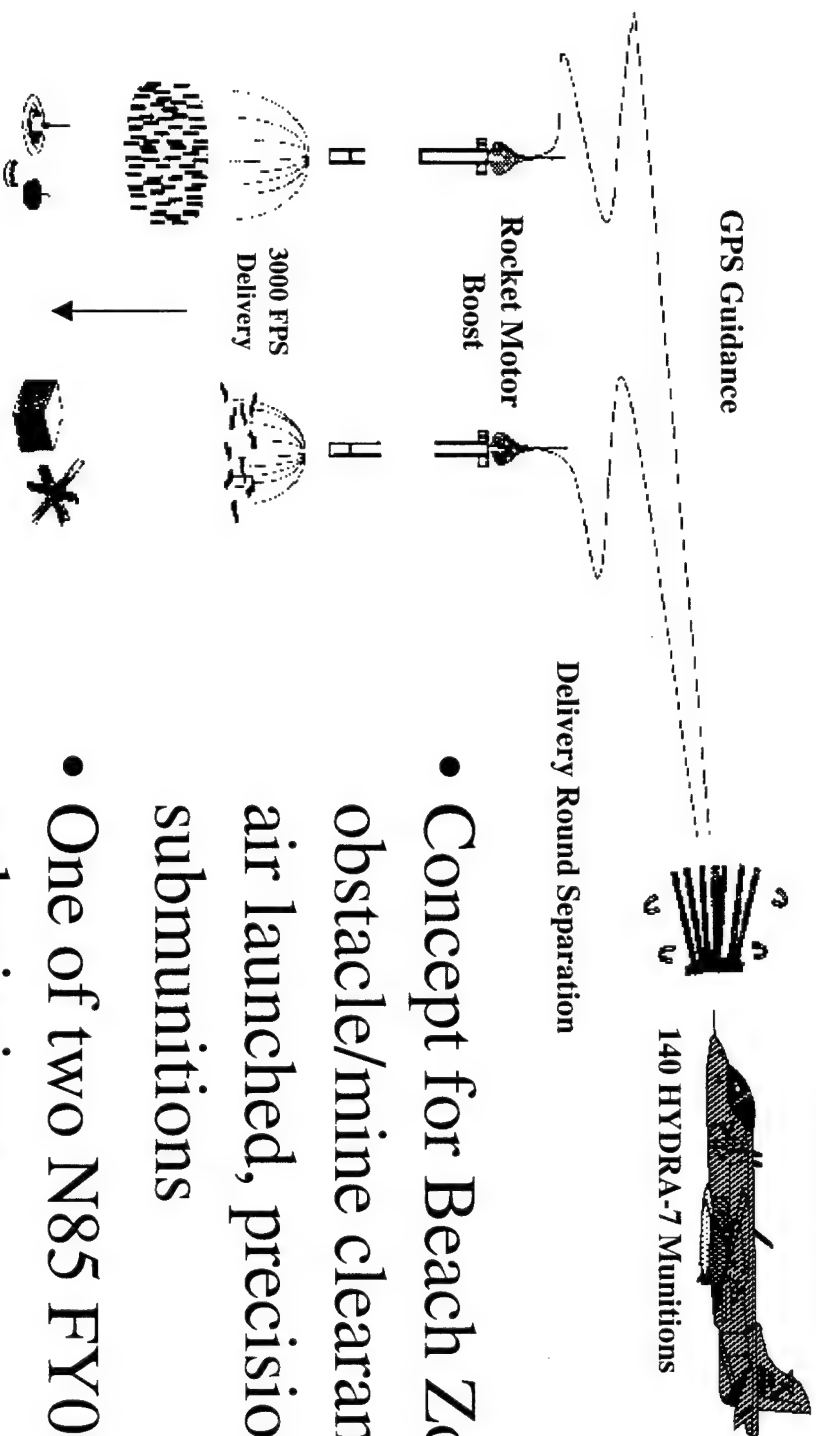
## Far Term

Development of "System of Systems" to Remove Divers & Mammals from VSW/SZ Operations





# In-Stride Mine/Obstacle Breaching HYDRA-7



- Concept for Beach Zone obstacle/mine clearance using air launched, precision-guided submunitions
- One of two N85 FY00 ATD submissions

Mine Clearance      Obstacle Clearance

TECHNOLOGY TEAM:      Navy

*Lockheed Martin*



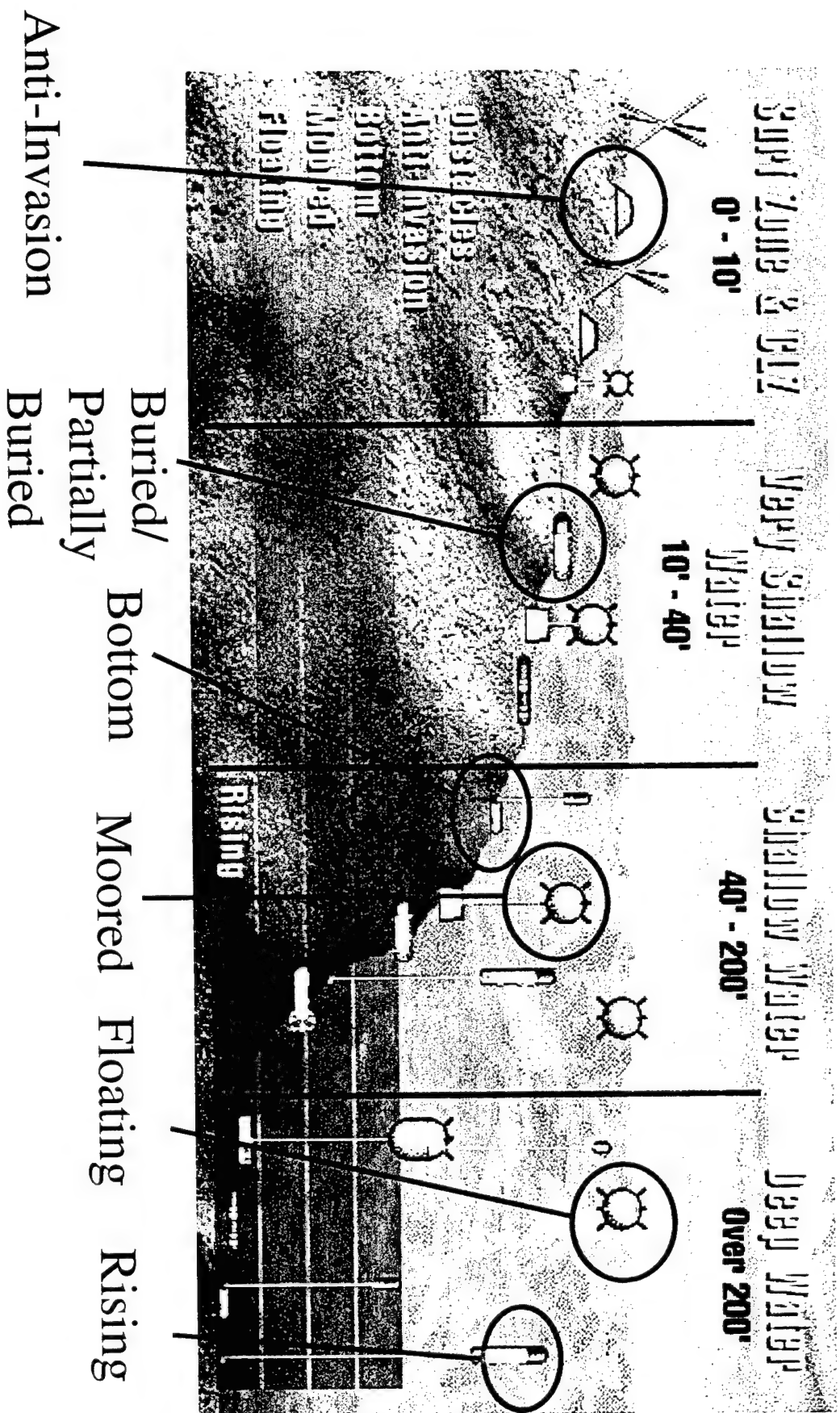
## Summary

---

- MIW is a high priority at ONR
- MIW S&T investments fully support Organic Mine Countermeasures
  - Integrated with Acquisition Plan
  - Critical demonstrations to mitigate risk/enhance capabilities
- MIW S&T investments are directed at long term vision
  - Rapidly deployable autonomous systems, in-stride clearance

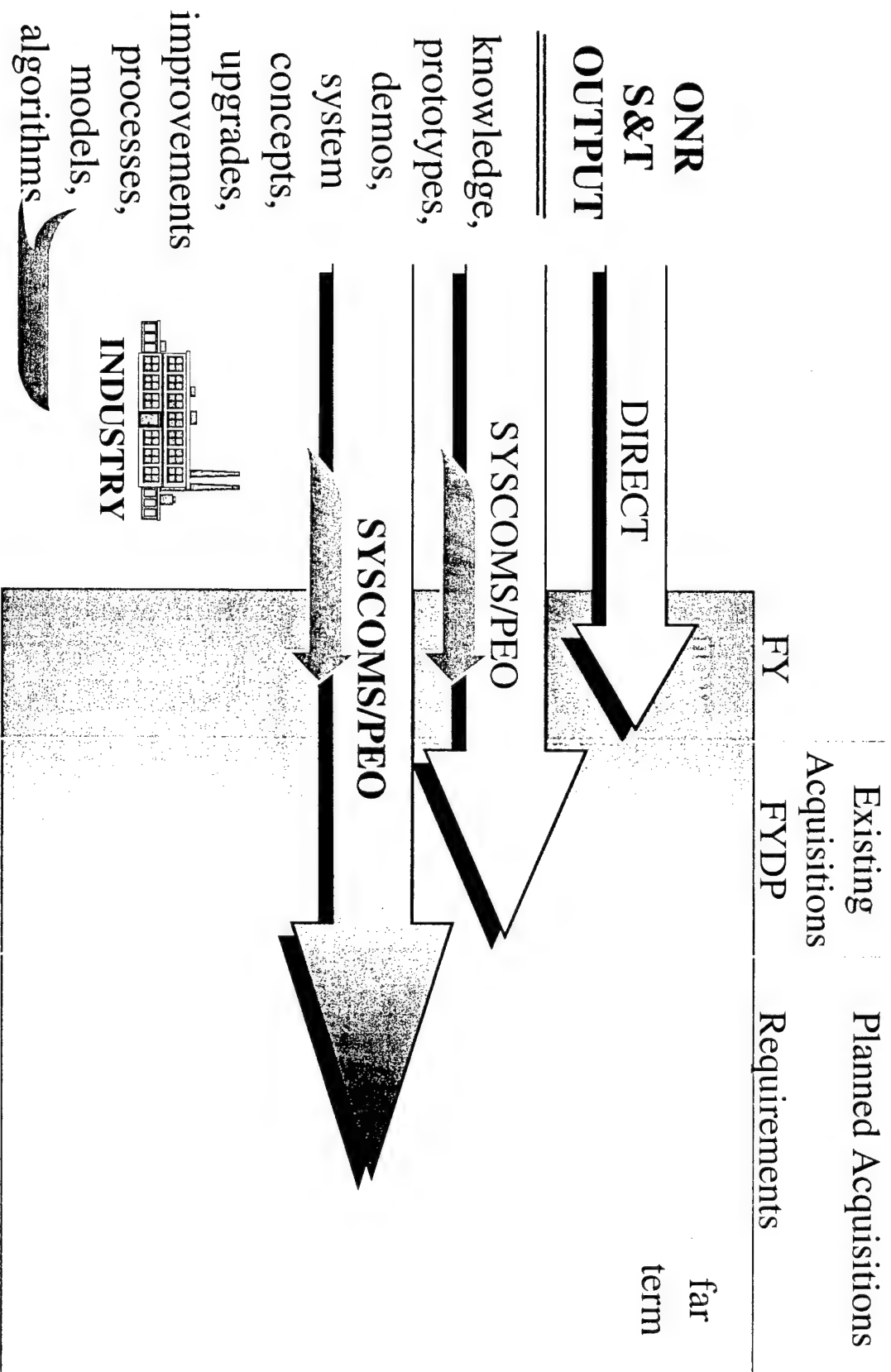


# Complex Environment





# S&T Timeline



\* S&T Has More Than One Customer \*

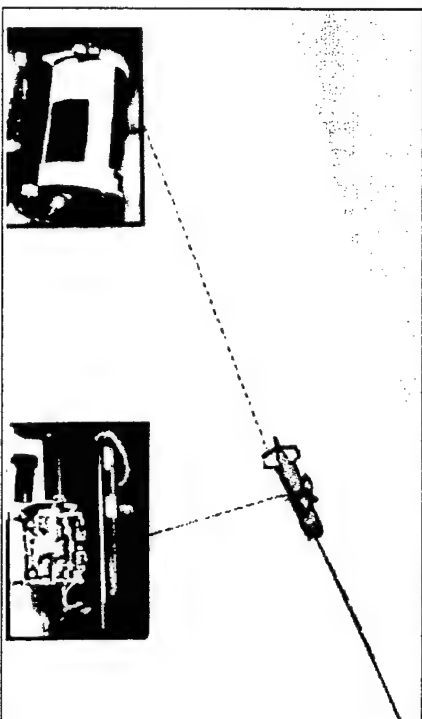


# Planned Demonstrations

## Kernal Blitz

---

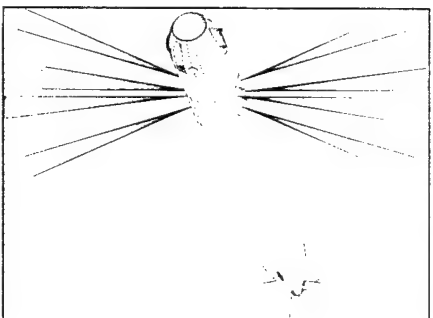
Shallow Water Adv Sensors



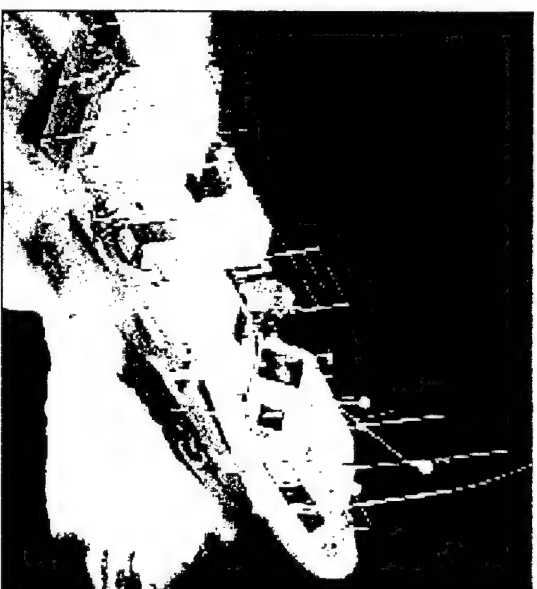
Littoral Remote Sensing



REMUS



ALISS

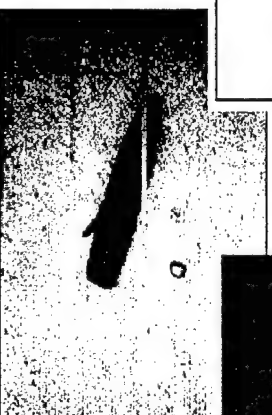
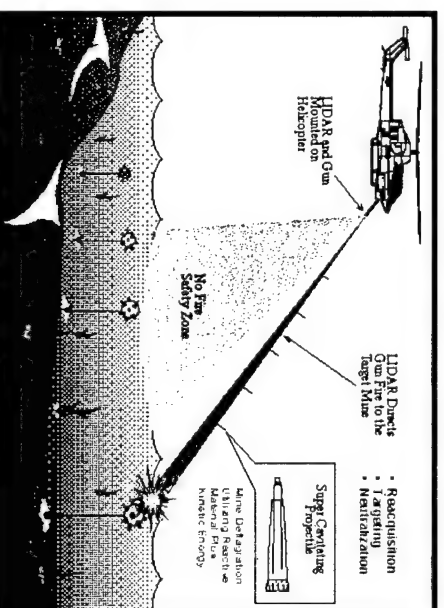
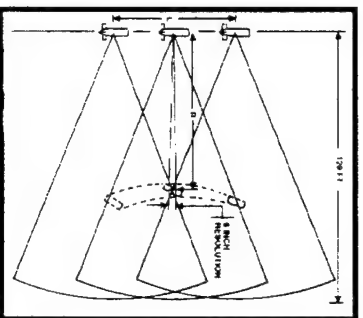






# Example High Payoff Technologies

## Addressing Affordability and Speed of MCM OPS

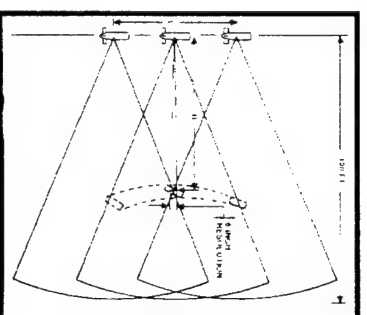
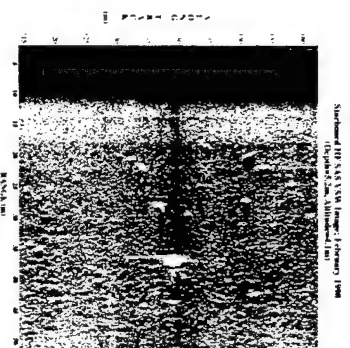




# Synthetic Aperture Sonar Technology

---

- Reduce wet-end size and cost using synthetic aperture technologies
  - Produces high resolution with small physical aperture
  - Size/cost reduction dependent upon operating frequency
    - Potential order of magnitude reduction at low frequencies
- Phase compensation and auto-focusing processing technologies to adapt to environment



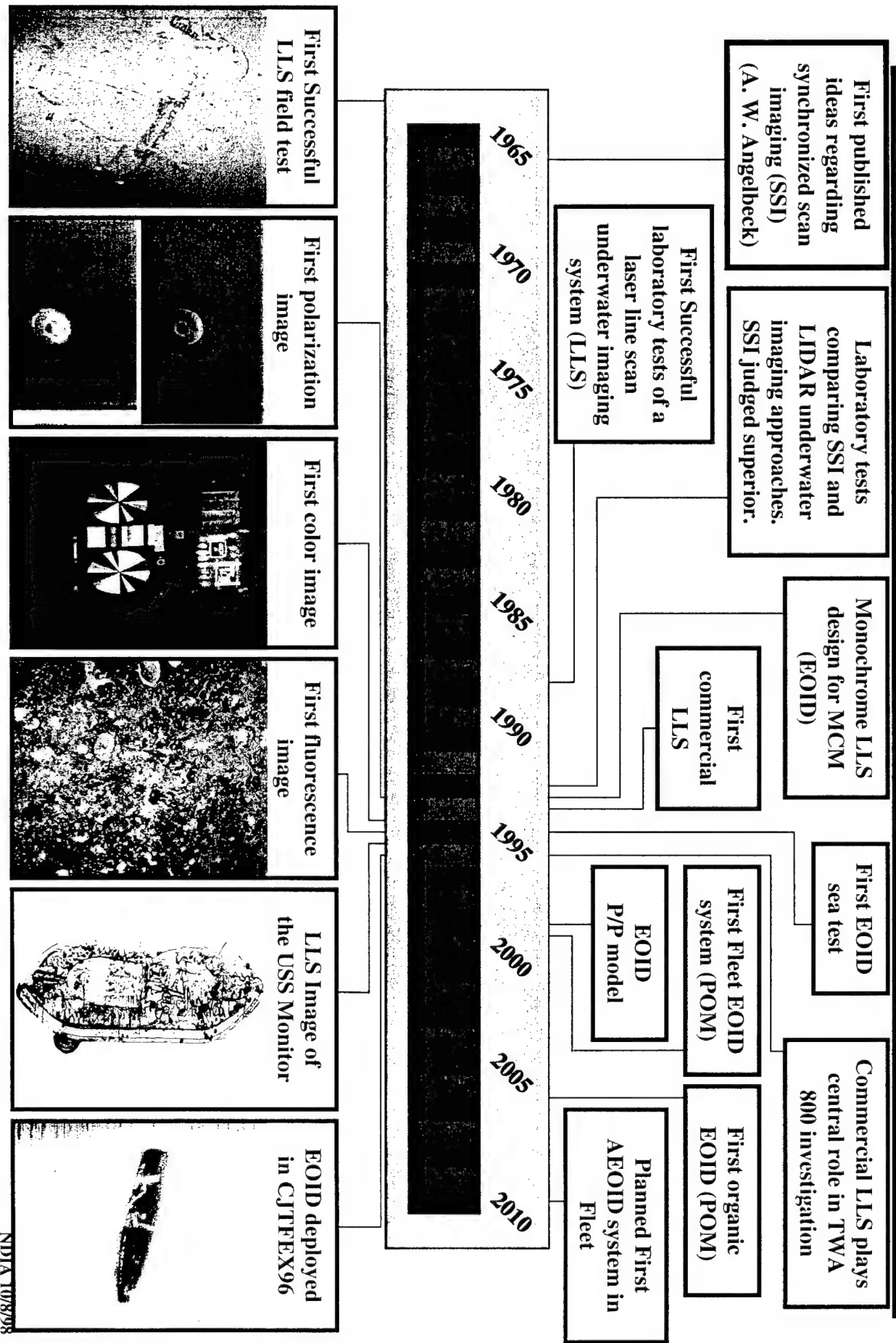
TECHNOLOGY TEAM:

*Navy*

*Northrop-Grumman*



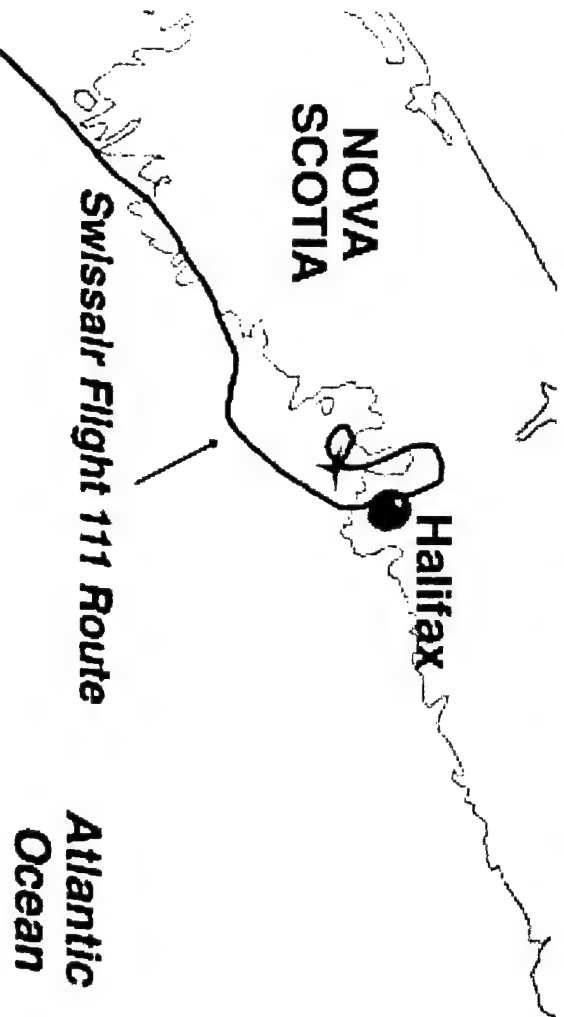
# Laser Line Scan Development Roadmap



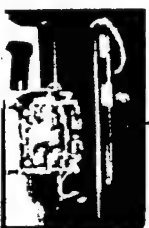
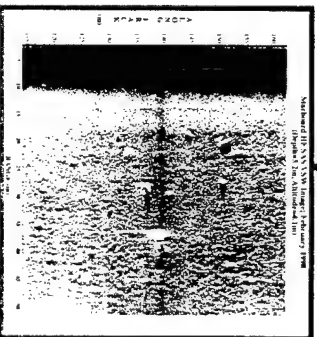


# Swissair Crash Site Investigation

## *Response to Canadian Government Request*



SAS

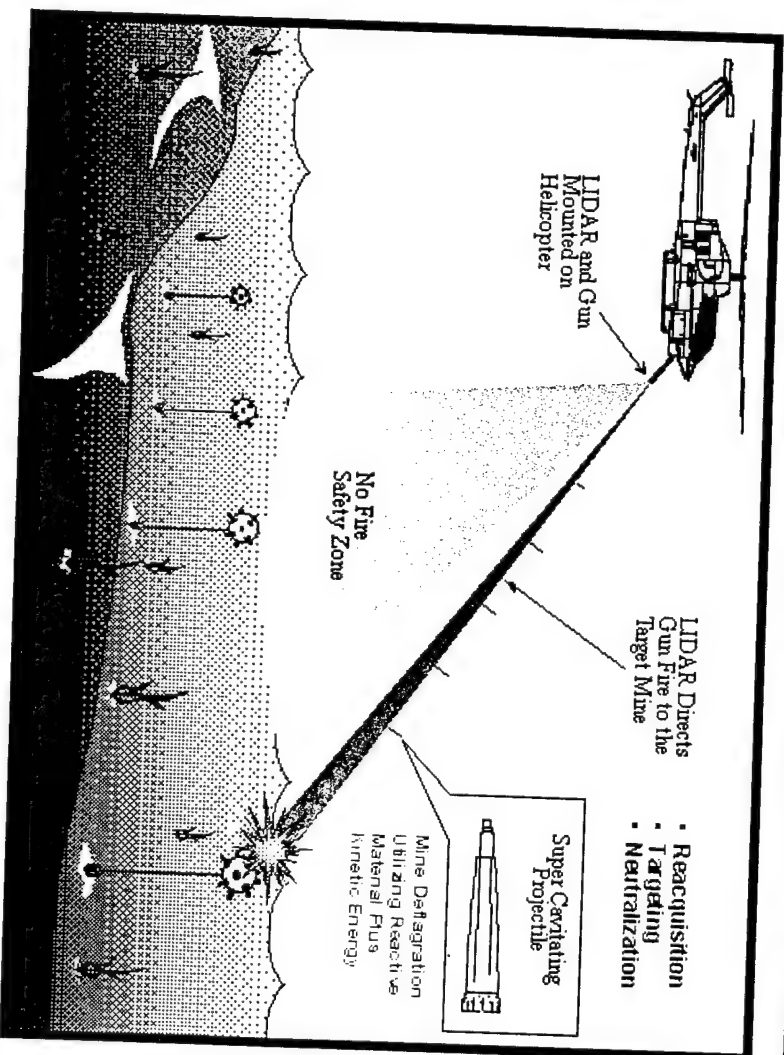


LLS





# Rapid Area Mine Clearance System (RAMICS) ATD



- ORGANIC CAPABILITY FOR RAPID CLEARANCE OF NEAR SURFACE MOORED CONTACT MINES
- ATD DEMONSTRATES INTEGRATED TARGETING, FIRE CONTROL, GUN SYSTEM, AND PROJECTILE TECHNOLOGIES

## TECHNOLOGY TEAM:

*Navy*  
*Raytheon*  
*General Dynamics*  
*C-Tech*  
*Kaman*



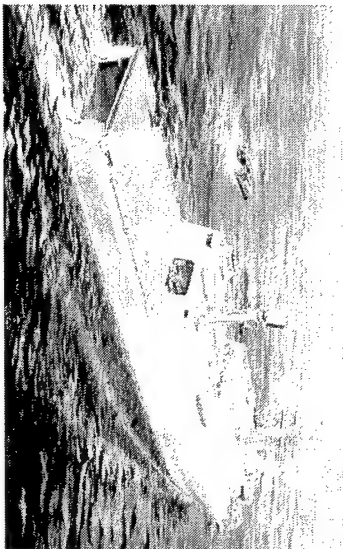
# Forward... From the Sea



# 12 Amphibious Readiness Groups



**LHD**

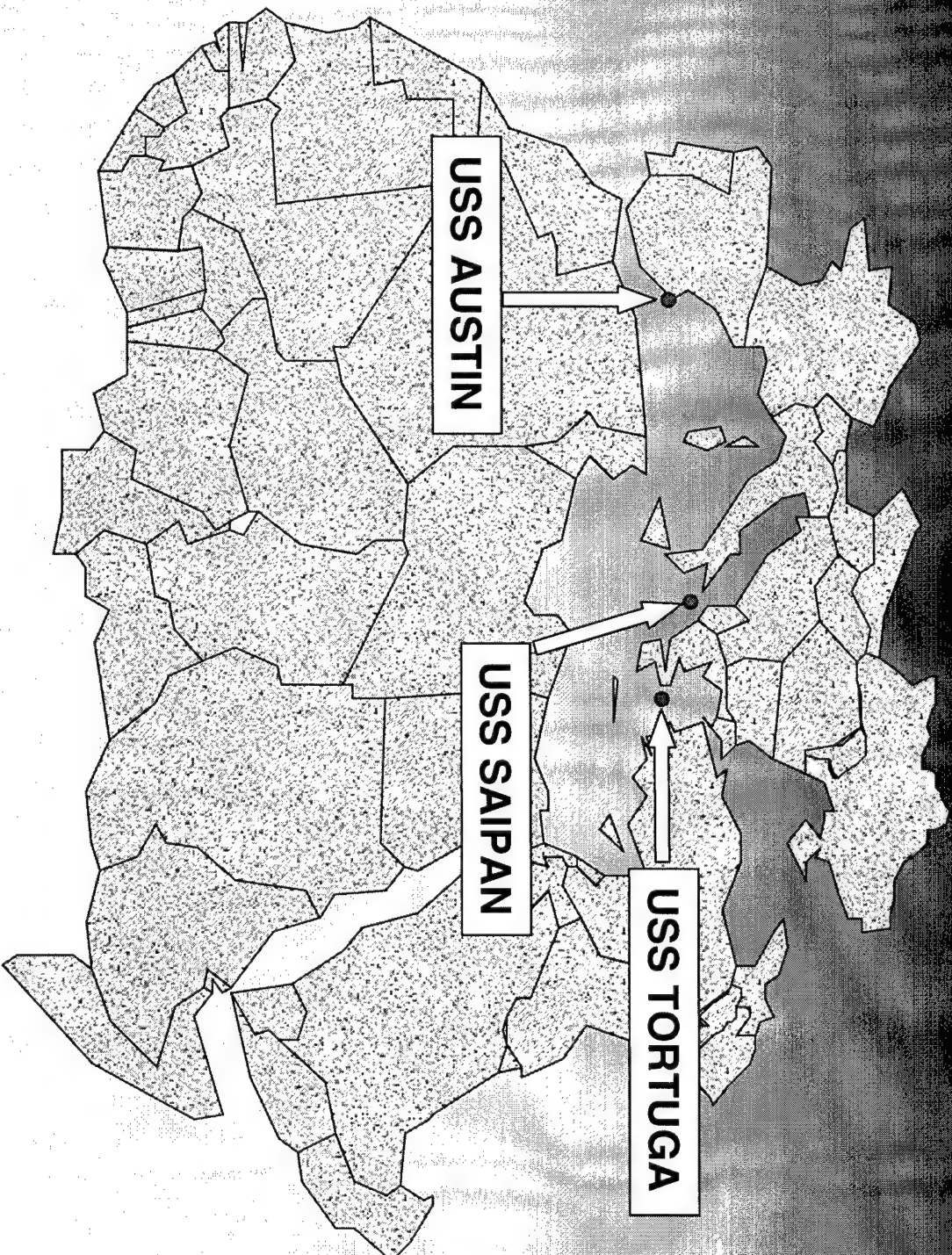


**LPD**



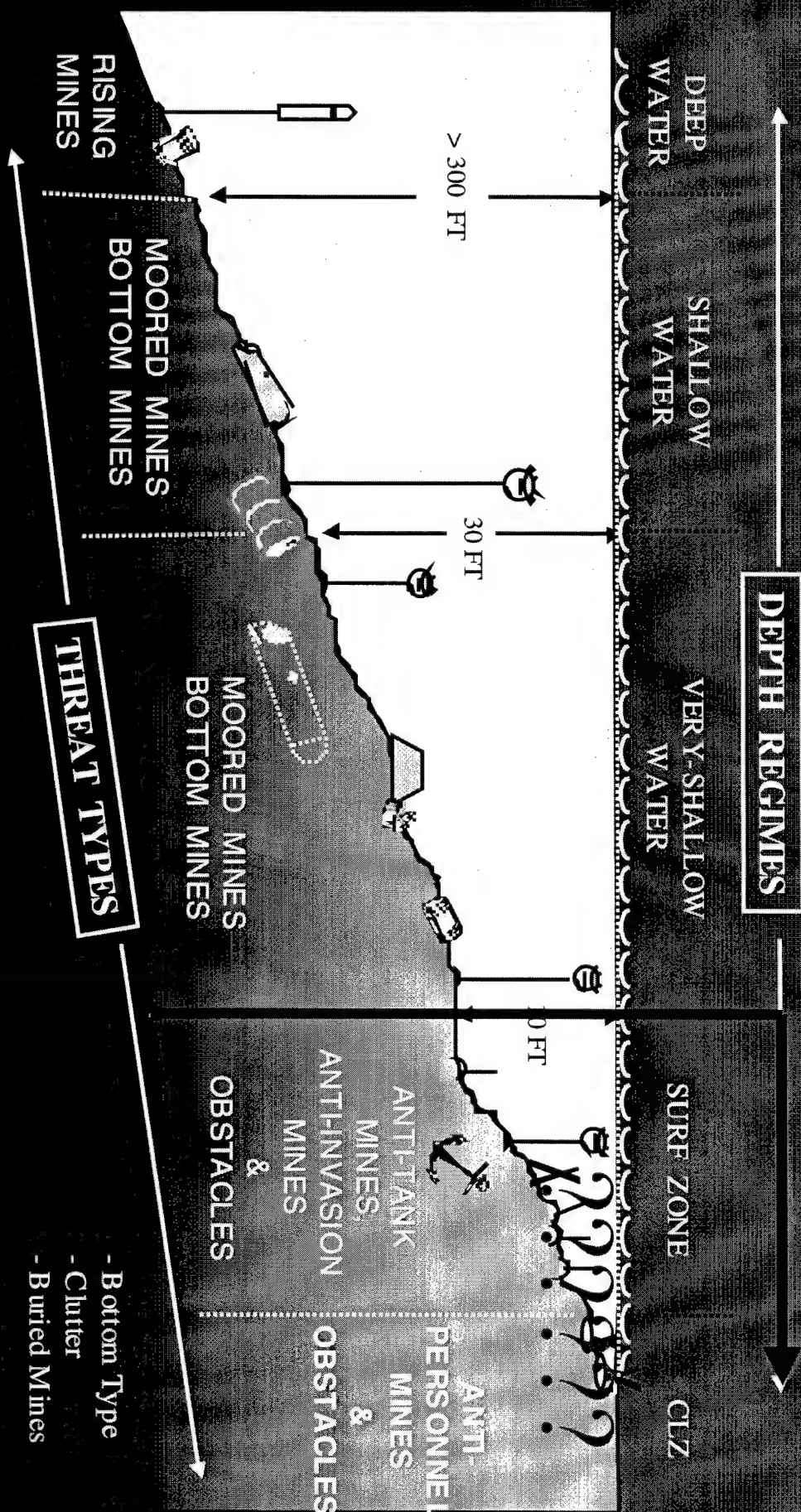
**LSD**

# SPLIT ARG OPERATIONS

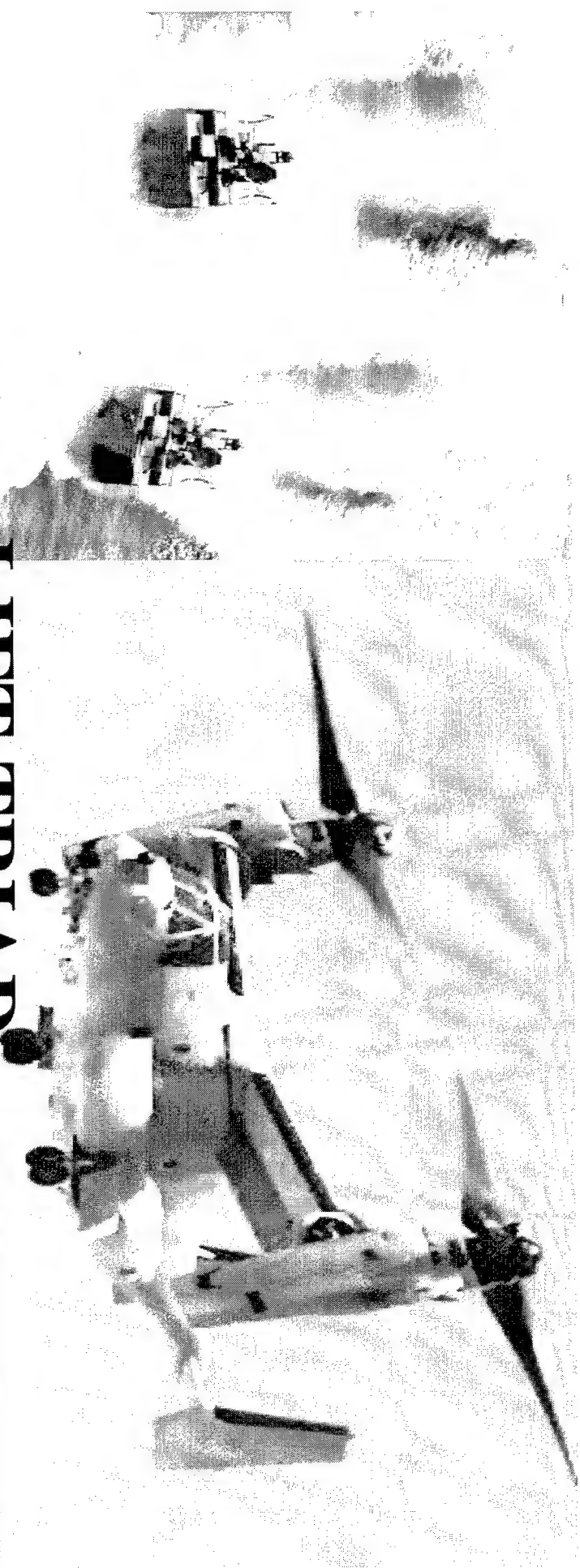




# MCM CHALLENGE

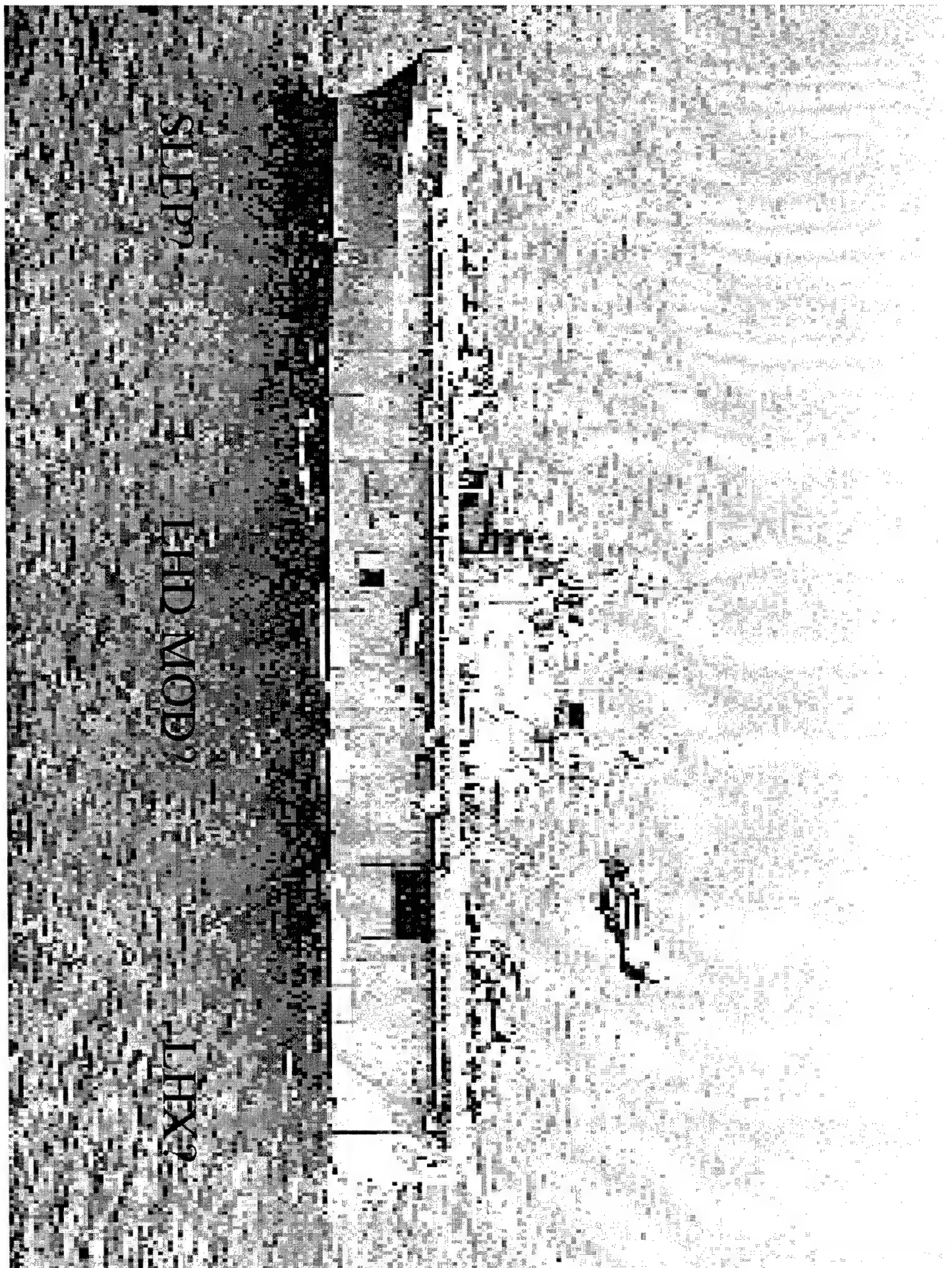






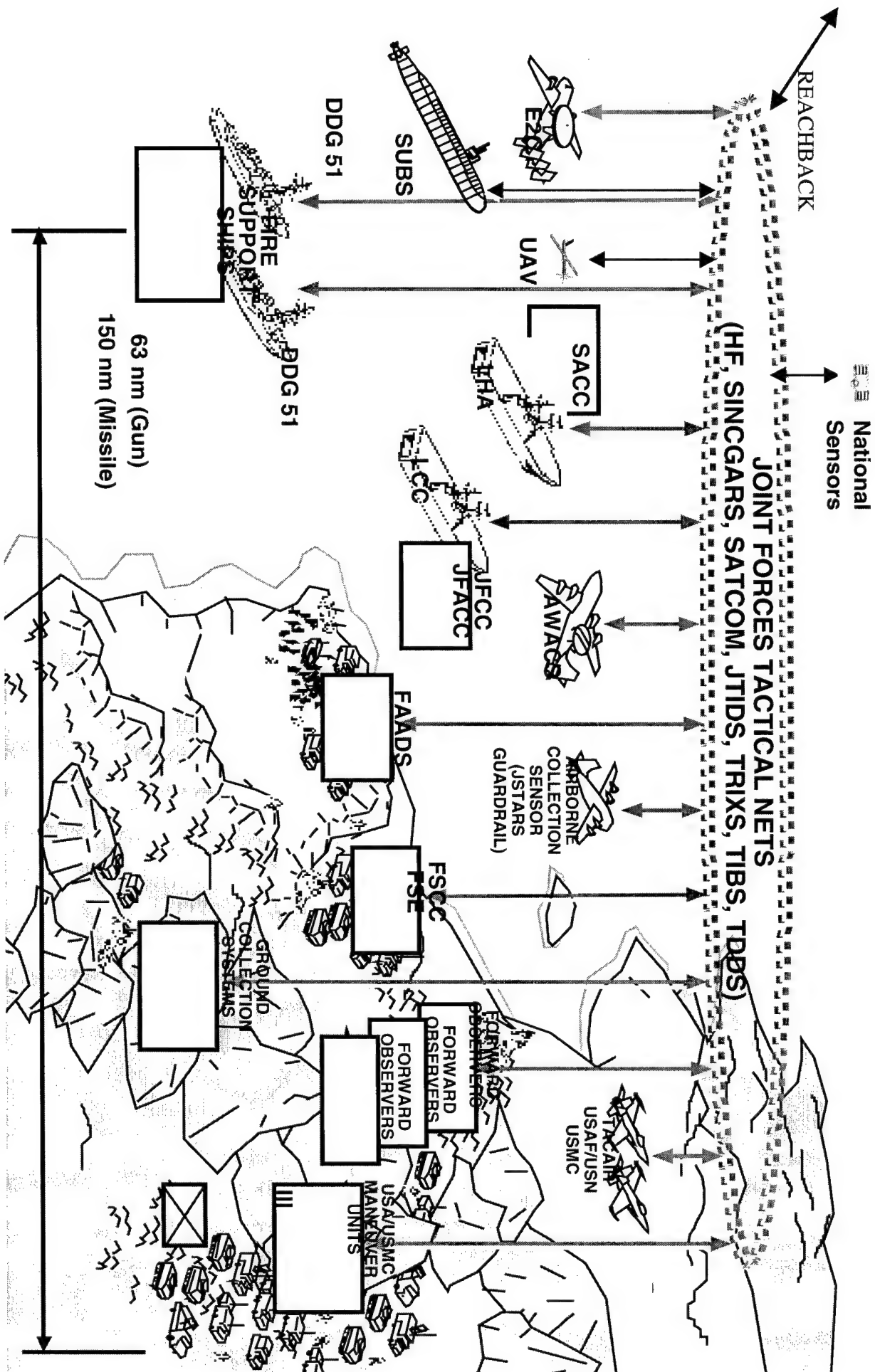
# LEFT TRIAD



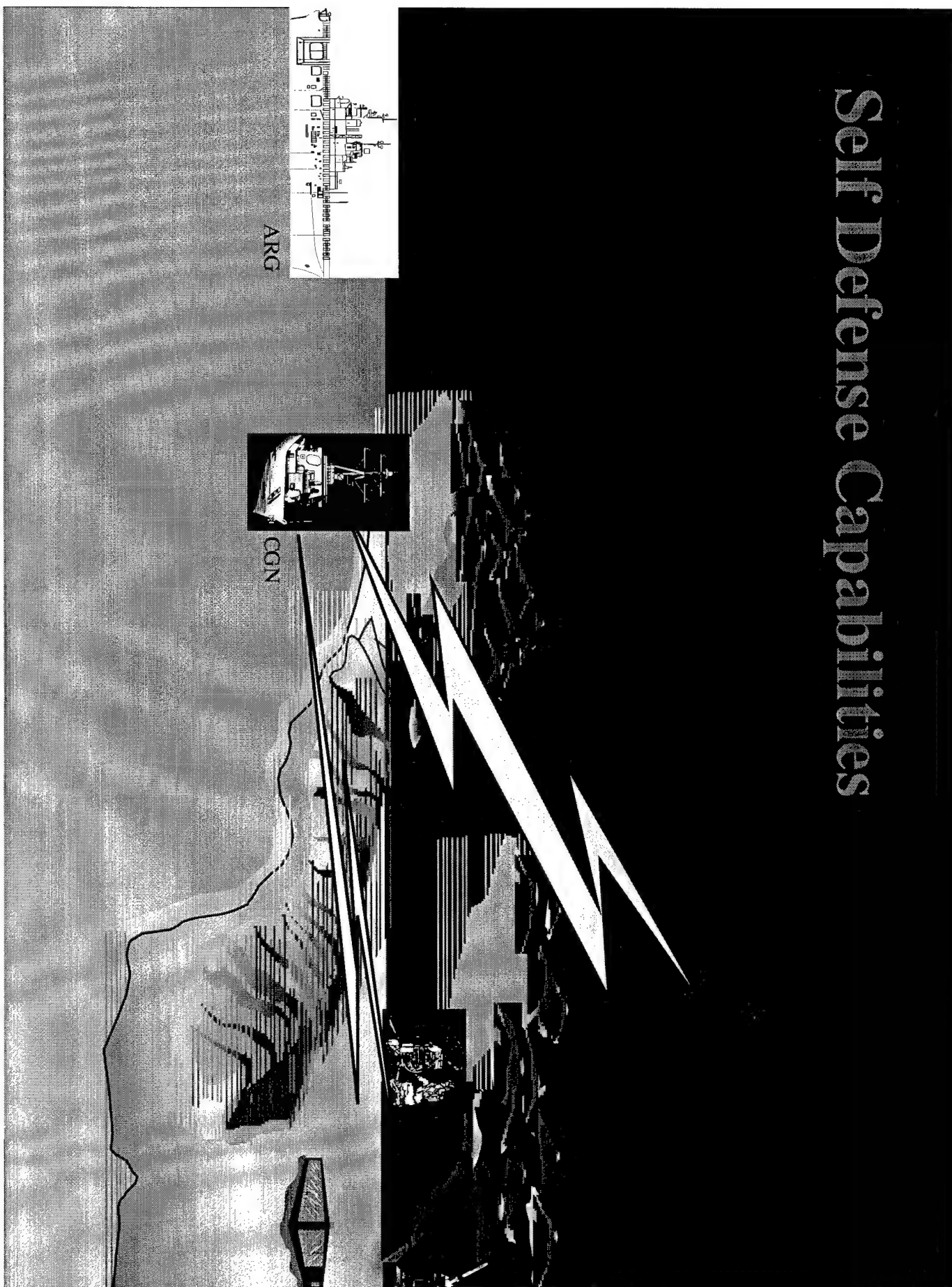




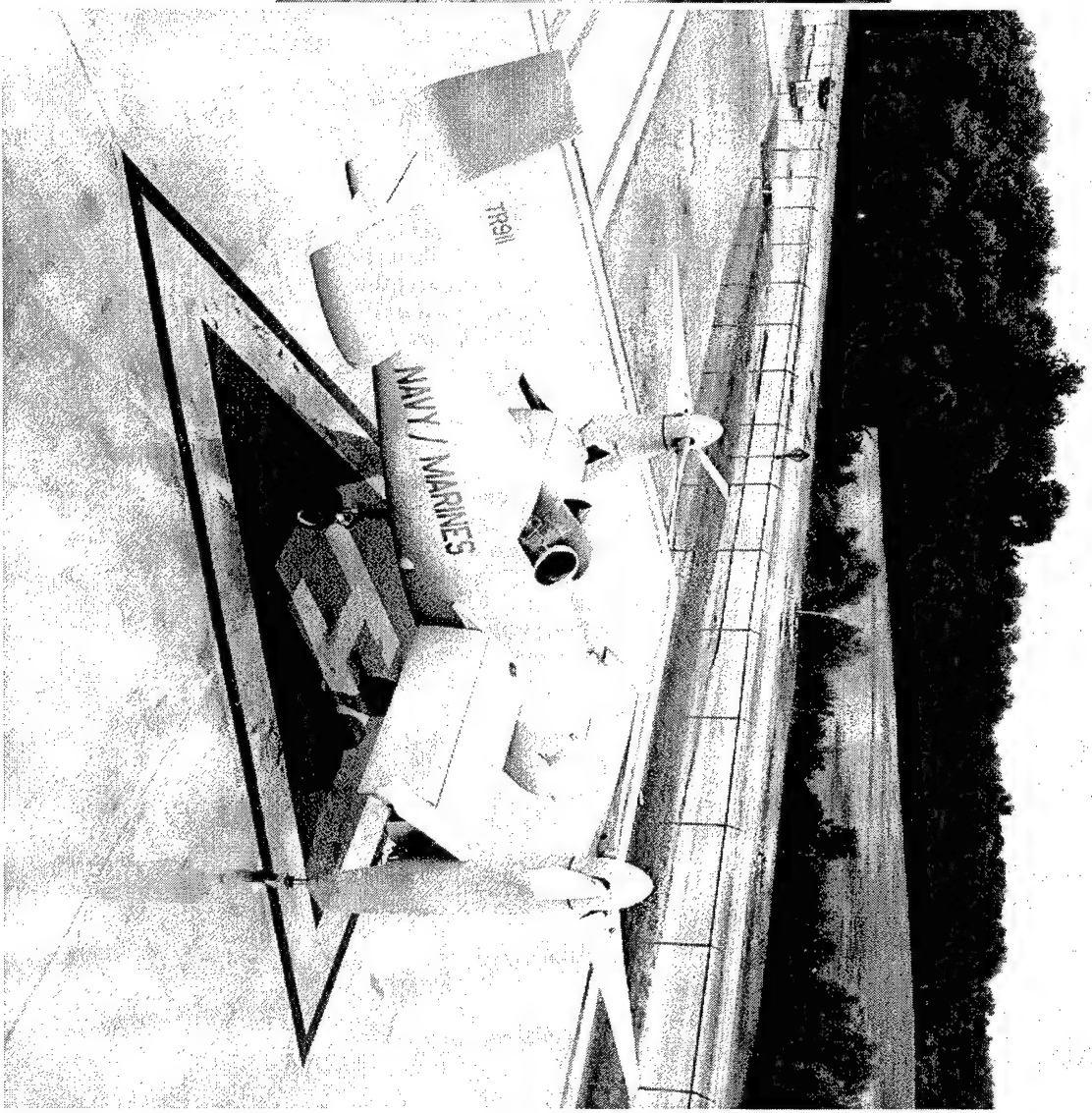
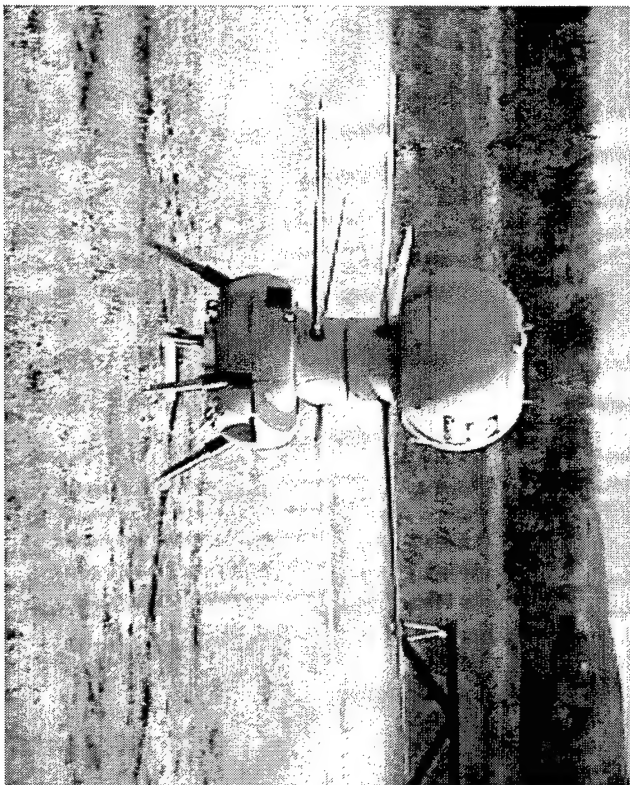
# ENHANCED C4I CAPABILITY



# Self Defense Capabilities

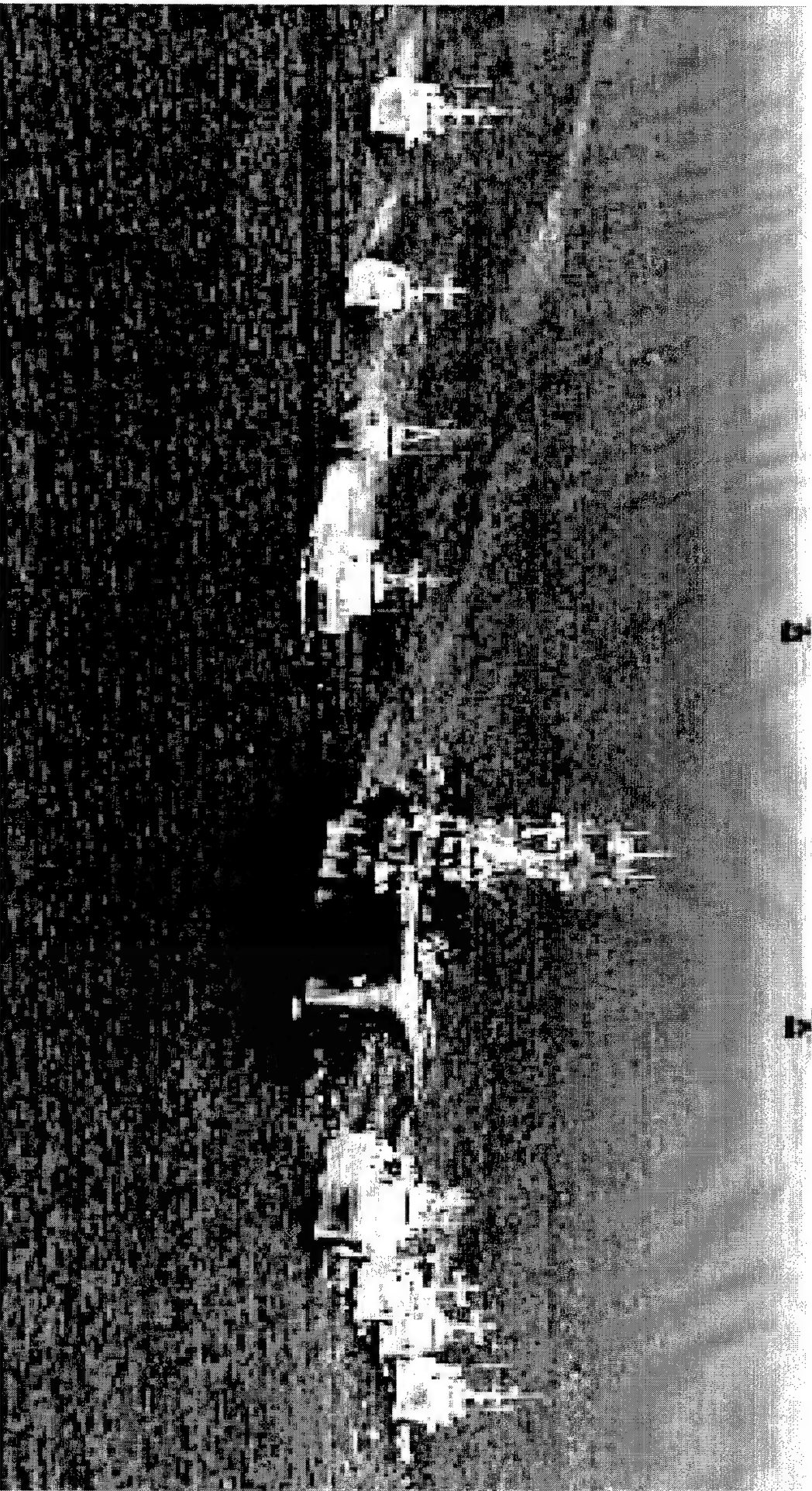


# Naval Tactical Unmanned Vehicle Program VSTOL



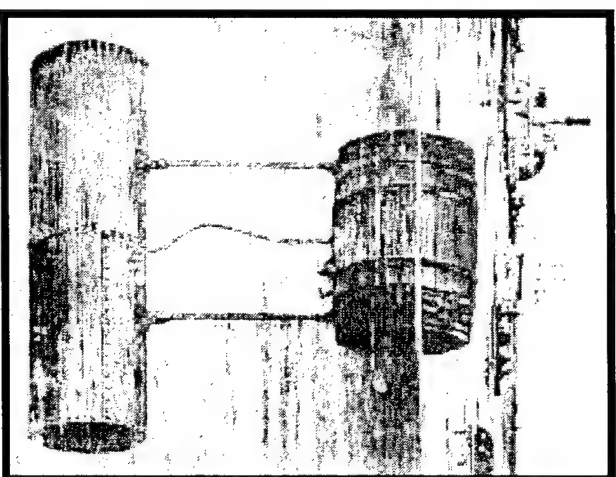


# SLEEP or New Construction?





# ***Mine Warfare ... An Enduring Challenge***

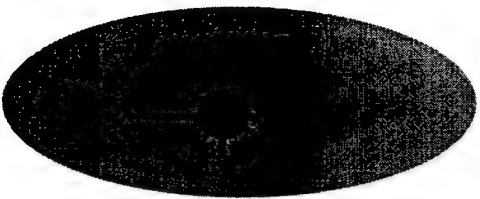


**Rear Admiral William J. Marshall, III**  
**Commander Steven E. Lehr**  
**National Defense Industry Association**  
**3 November 1998**

# The Asymmetric Threat

Capabilities That Adversaries May Pursue to Counter U.S. Strengths

HIGH  
R  
I  
S  
K  
to  
U.  
S.  
LOW



EASY

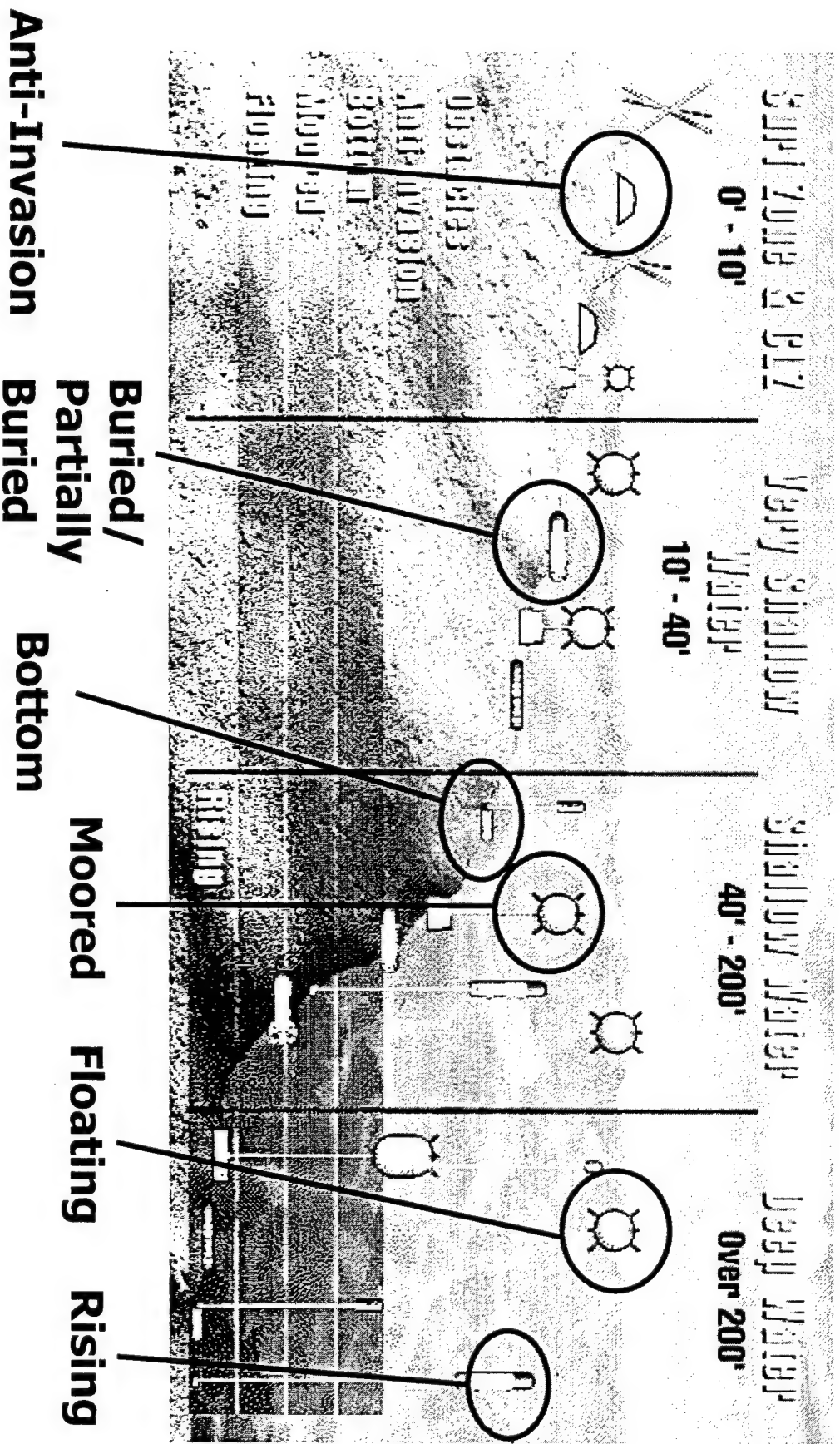
DIFFICULTY for ADVERSARY

DIFFICULT

to ACQUIRE and to USE EFFECTIVELY



# Complex Environment

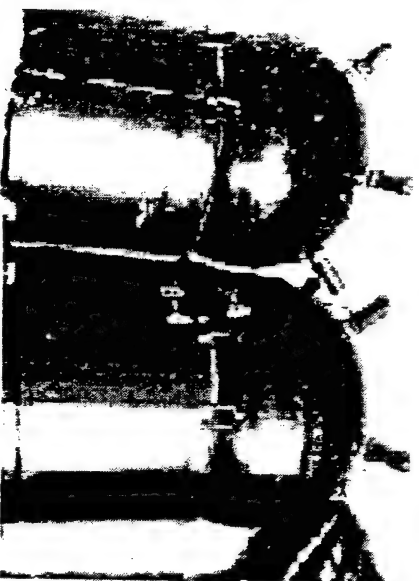


# What Is the Threat?

## Moored



RISING MINE (CHINA)

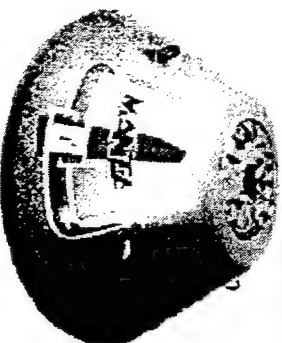


M-08 (IRAN)

## Bottom



ROCKAN (SWEDEN)

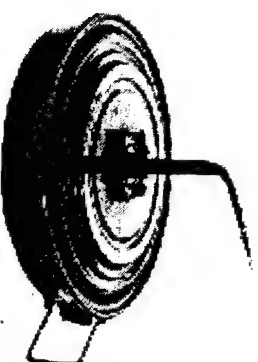


MANTA (ITALY)

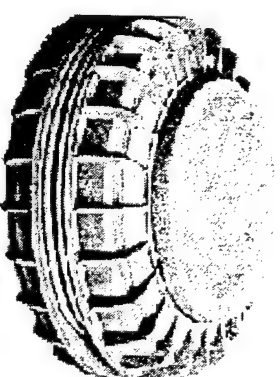


MR-80 (ITALY)

## Anti-Invasion

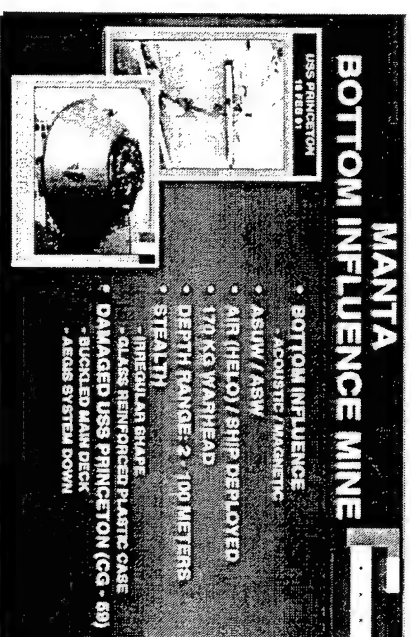


TM-46 (FSU)



VS 1.6 (IRAN)

# The Growing Threat



## • Broad Spectrum

## • Readily Available

### • Low Cost/Low Tech-

### • Over 50 Countries

### High Volume

(40% Increase in 10 Yrs)

### • High Tech/Med Cost-

### • Over 300 Types

### Stealth & Anti-MCM

(75% Increase in 10 Yrs)

### • WWII Vintage to

### • 32 Countries Produce

### Advanced

(60% Increase in 10 Yrs)

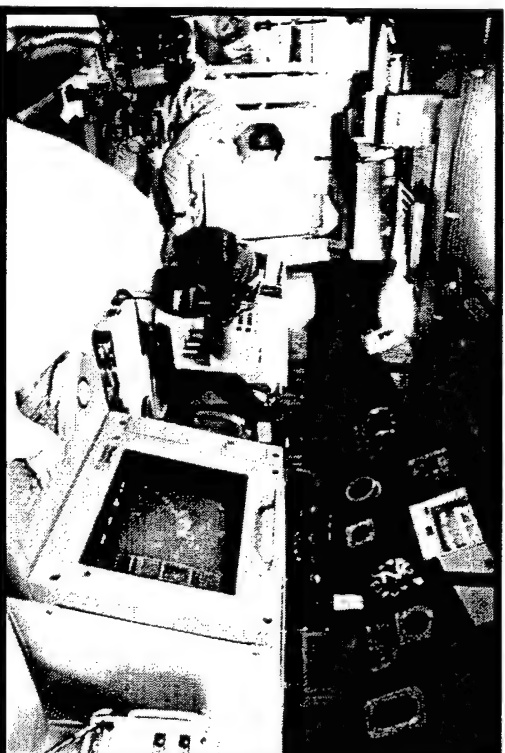
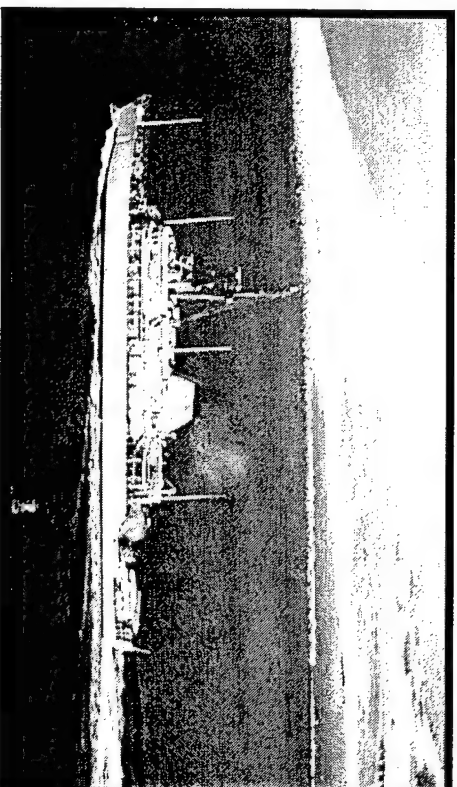
### Technologies

### • 24 Countries Export

(60% Increase in 10 Yrs)

# A World Class MCM Force

- Ships and Aircraft
  - MCM-1 Avenger Class
  - MHC-51 Osprey Class
  - MCS-12 Class Conversion
  - Two MH-53 Squadrons
- Sensors
  - SQQ-32 Minehunting Sonar
  - SLQ-48 Mine Neutralization System
  - AQS-14 Minehunting Sonar
- VSW MCM Detachment
  - MK7 Marine Mammal System
  - MK4 Marine Mammal System
- Miscellaneous
  - MEDAL, AMCM PMA

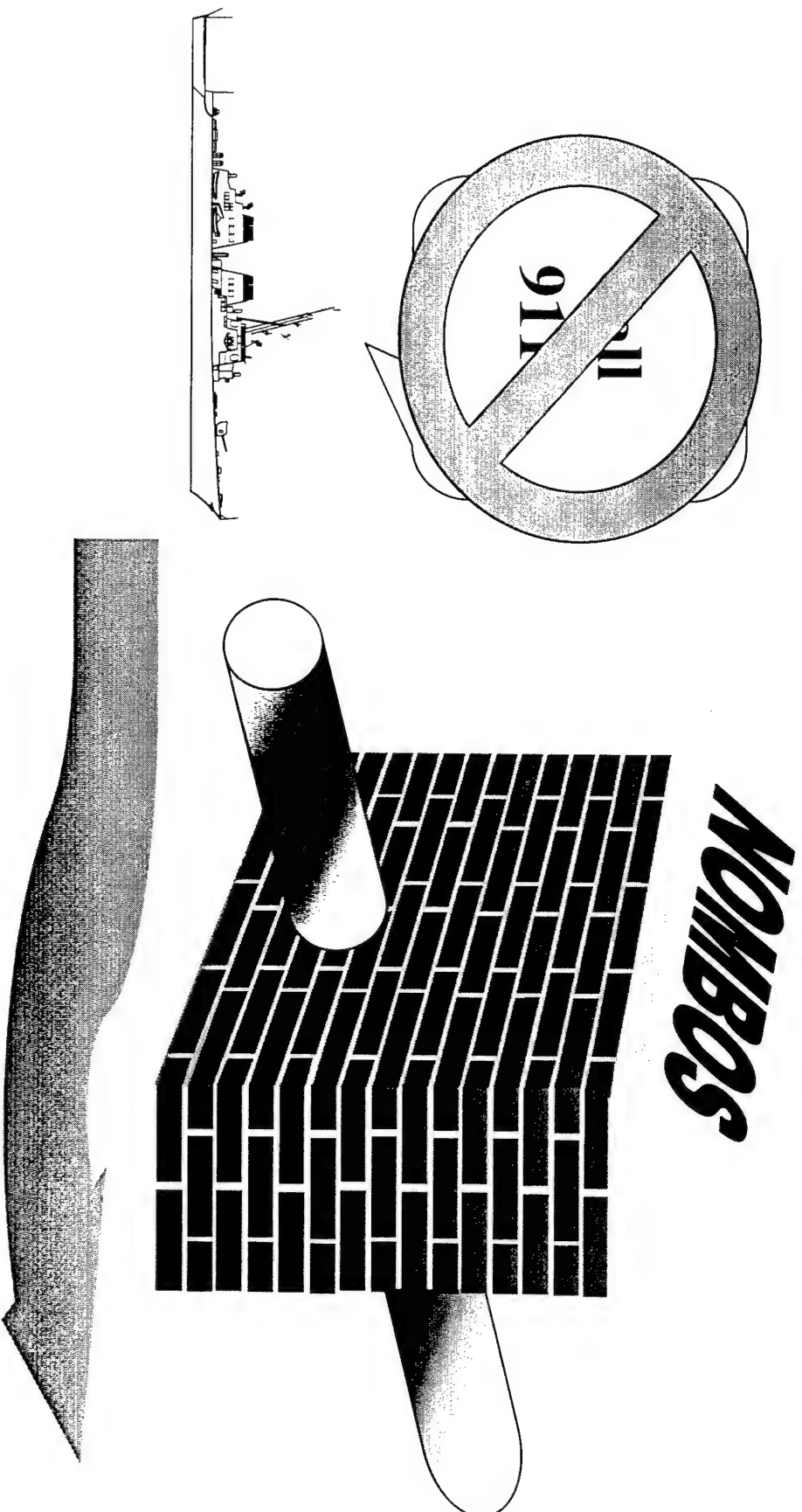


# **Still Not Good Enough...Must Go Organic**

---

- What is Organic?
  - An Integral Part...
  - A Capability That Is Carried in Forward Deployed Forces to Allow Early MCM Operations and ...
  - The Ability to Conduct MCM Operations Enroute

# Defining Organic MCM....



***...Minimize Impact on Speed of Advance***

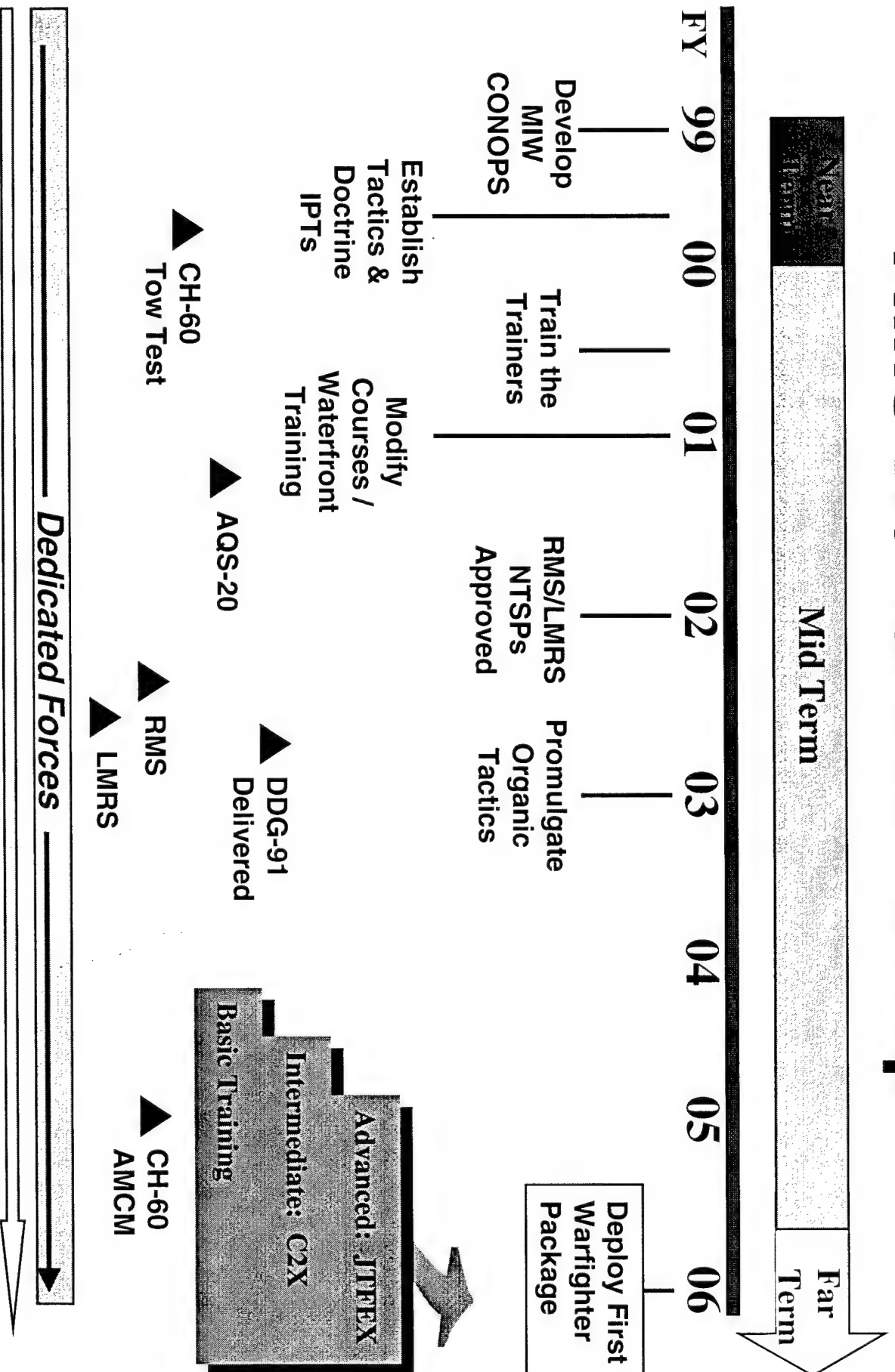


# **Navy MCM Strategy**

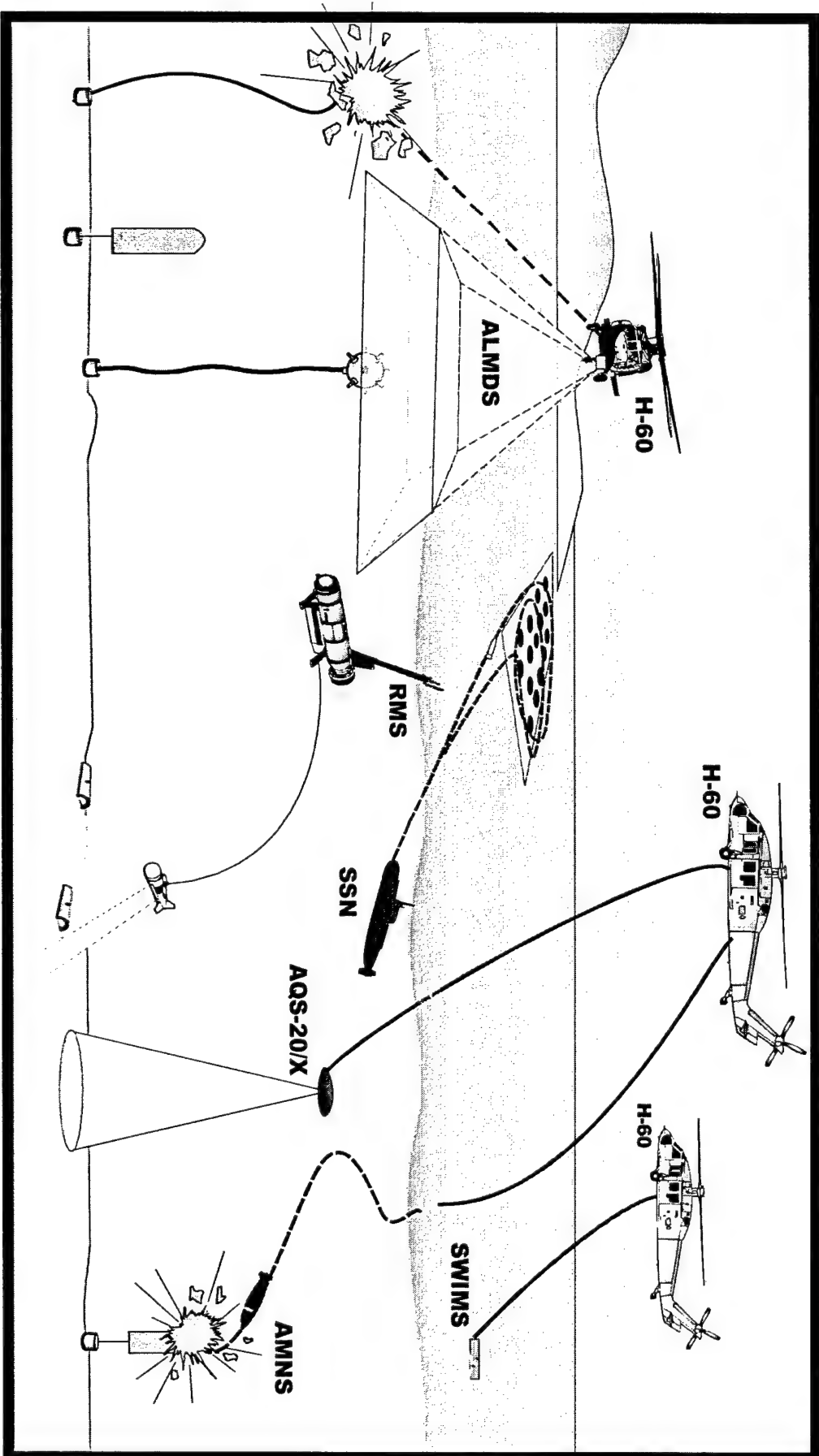
---

- Near-Term: 1998-99
  - Increase MCM Presence
  - Develop Fleet Engagement Strategy
- Mid-Term: 2000-05
  - Introduce Organic Systems
  - Implement Fleet Engagement Strategy
- Far-Term: From 2006 Onward
  - Full Integrated Warfighting Packages to Joint Task Forces

# Mine Warfare Roadmap



# Organic MCM Concept



# **Delivering Capability**

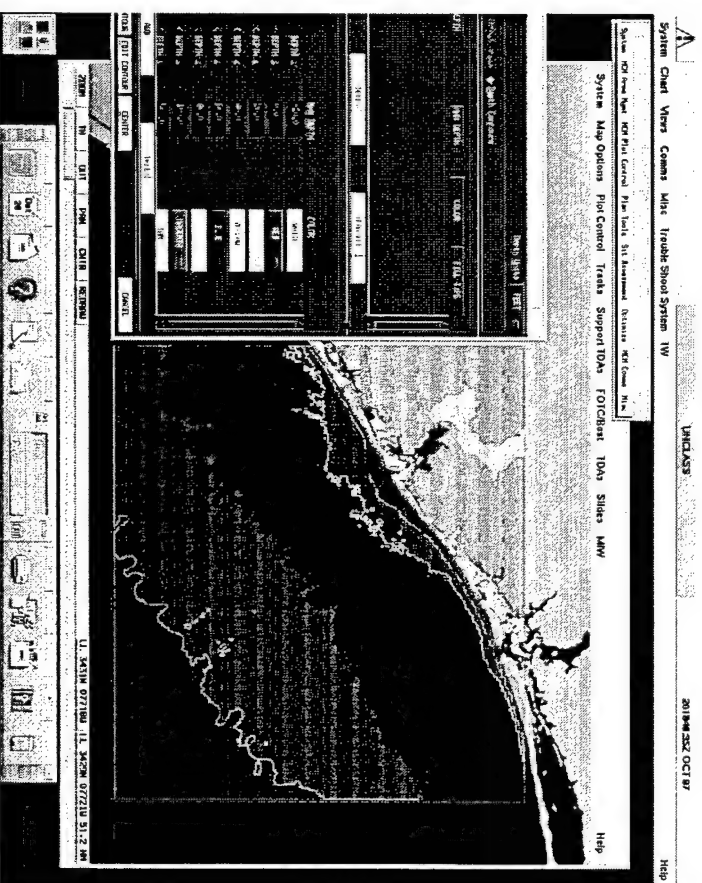
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- Warfighter's Organic MCM Package (BGs/ARGs)
  - Three AMCM H-60 Helicopters
    - ALMDS and RAMICS (Shallow Volume MCM)
    - AQS-20/X and AMNS (Deep and Bottom MCM)
    - SWIMS
  - Three Remote Minehunting Systems
  - One Long Term Mine Reconnaissance System
- MCM Force-21 Study
  - Composition - Force MCM Mix
  - Concept of Operations

# Fleet Engagement Strategy Mission

## *Develop and Execute An Engagement Strategy To:*

- Provide Organic MCM Sensors and Weapons to the Fleet
- Elevate the Mine Warfare Discipline
- Establish Mine Warfare Advocacy



# Fleet Engagement Strategy

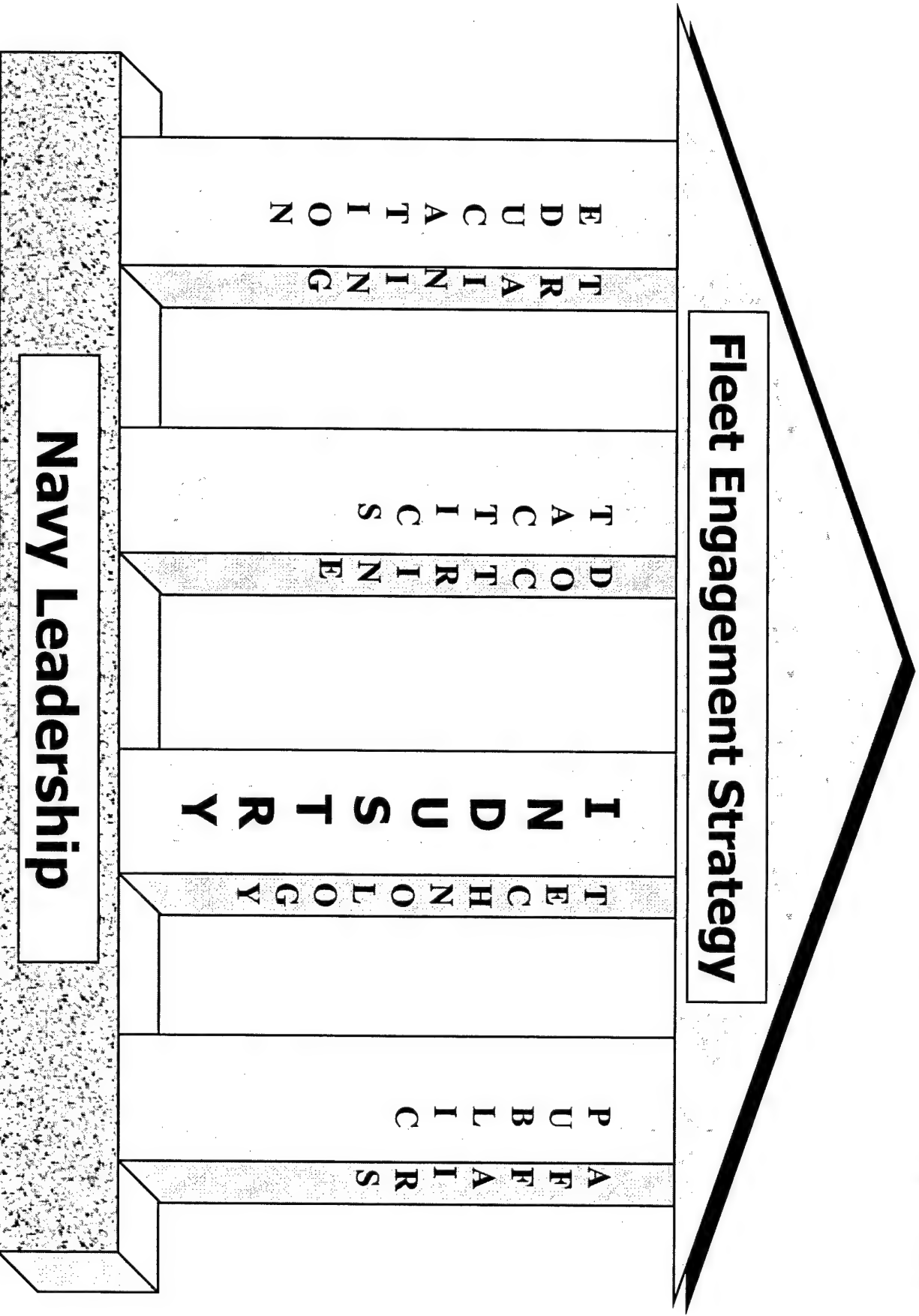
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## *Keys To Success:*

- Validation by Navy Leadership
  - Lead Organizations Develop and Execute Detailed, Comprehensive POA&Ms
- Total Commitment Throughout Navy
- Timing is Critical
- **Support From Industry**



# Mine Warfare For The 21st Century



# Fleet Engagement Strategy

**Education & Training**

Chief of Naval Education and Training & Fleet CINCs

**Doctrine & Tactics**

President Naval War College & COMINELWARCOM

**Public Affairs**

Chief of Information

**Industry & Technology**

Program Executive Office (MIW) & Office of Naval Research

**Acquisition**

**Fleet Engagement**

**Integrated Packages**

**Expertise**

**Warfighters**

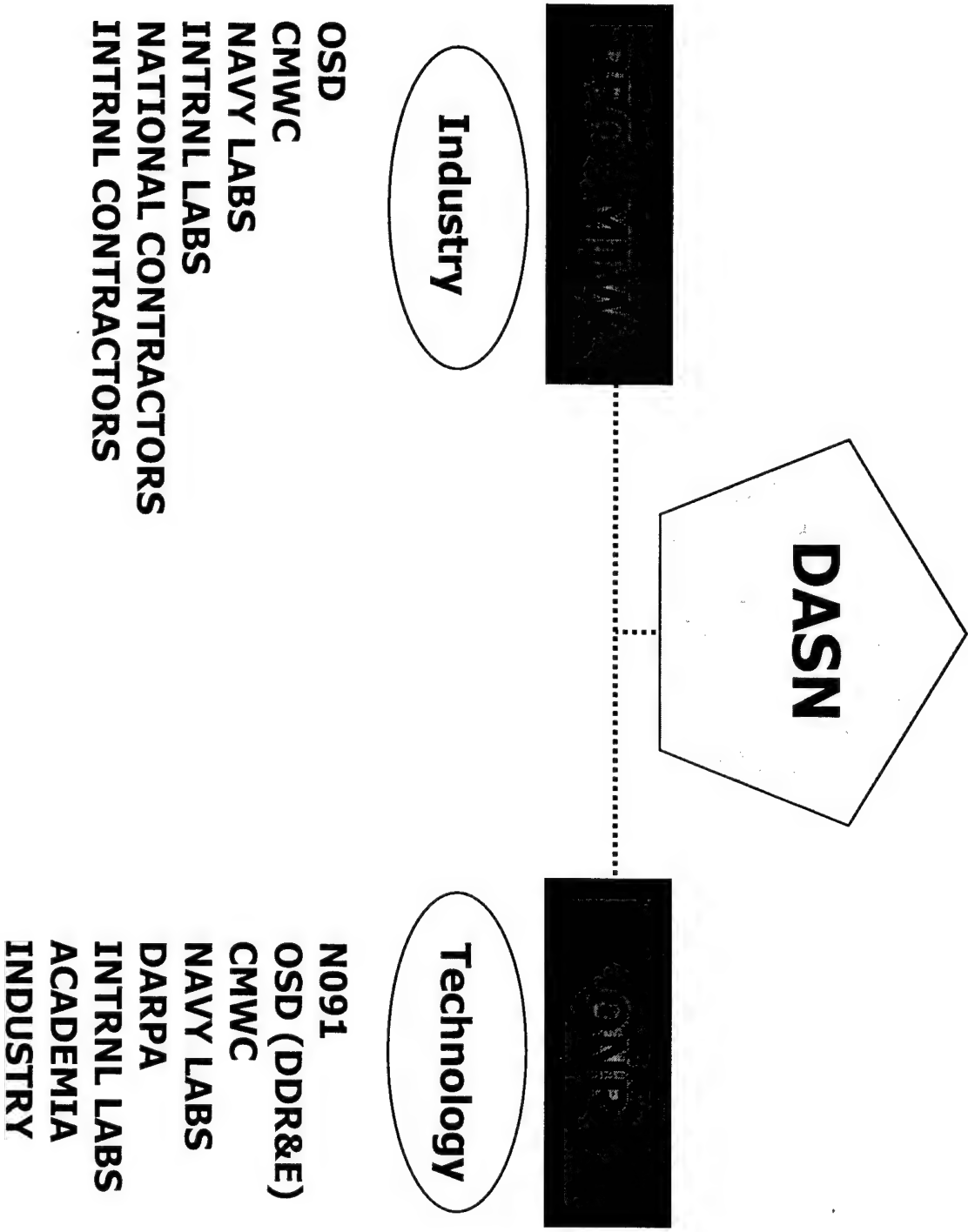


# Industry and Technology

---

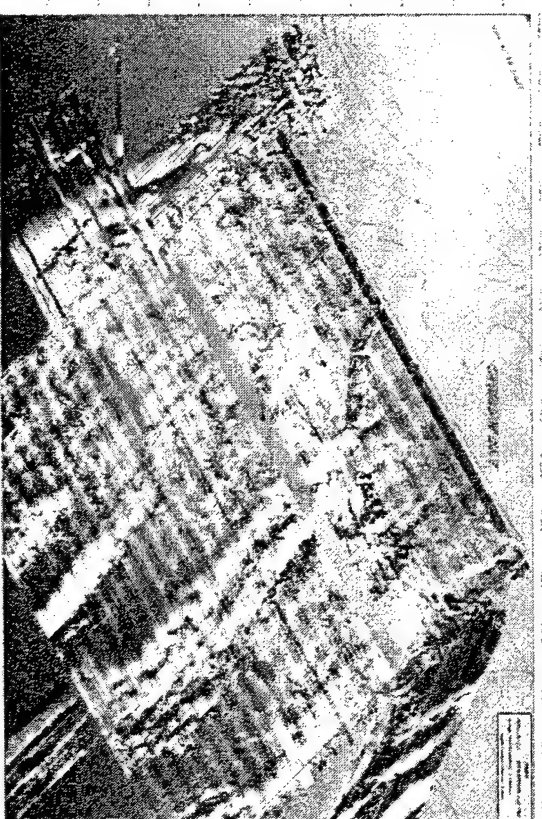
- Limited Focus on Fleet Interfacing Efforts in Industrial and Technology Areas
- Enhance Interaction Between the Technology/Industrial Bases and the Fleet
- Organic MCM Is a Technological Challenge... Technology Push Is High Risk
- Involve Industry to Reduce the Technological Risk

# Industry and Technology



# Mine Warfare Technology Challenges

- C4I
  - Robust Communications Between MCM Ships and Aircraft
  - Connectivity Between Dedicated and Organic Platforms
  - Interoperability
- Precise Underwater Navigation
- Data Fusion for Common Tactical Picture
- Bottom Mapping



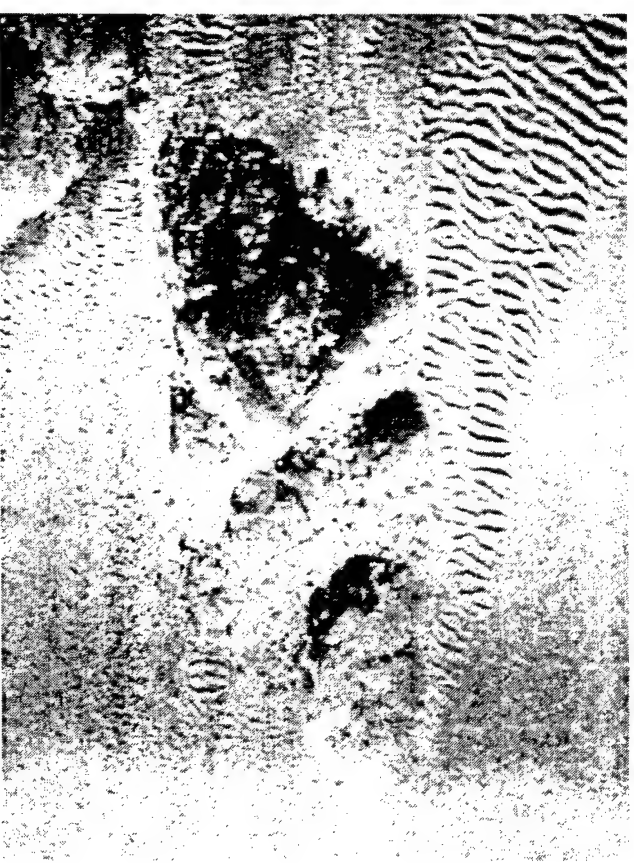
APPROACHES TO NEW RIVER INLET

# Mine Warfare Technology

## Challenges (cont.)

---

- Effective MH-53 Replacement
- Mine Detection/Classification/ID/Neutralization in VSW Region
- In-Stride Mine ID
- Environmental Exploitation
- Buried Mine Detection
- Pressure Mine Sweep
- Remote Control of Mines
- Emerging Mine Threat Technologies

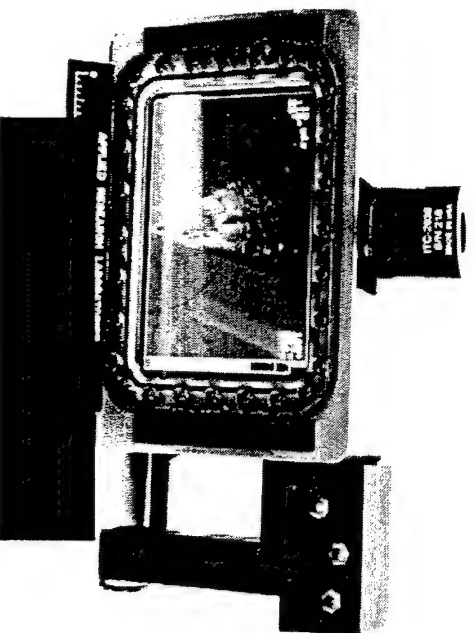




# **Very Shallow Water (VSW) Zone Technology Challenges**

---

- VSW MCM Unmanned Underwater Vehicles (UUVs)
- Command Initiated Neutralization Charges
- Clandestine Lane Marking



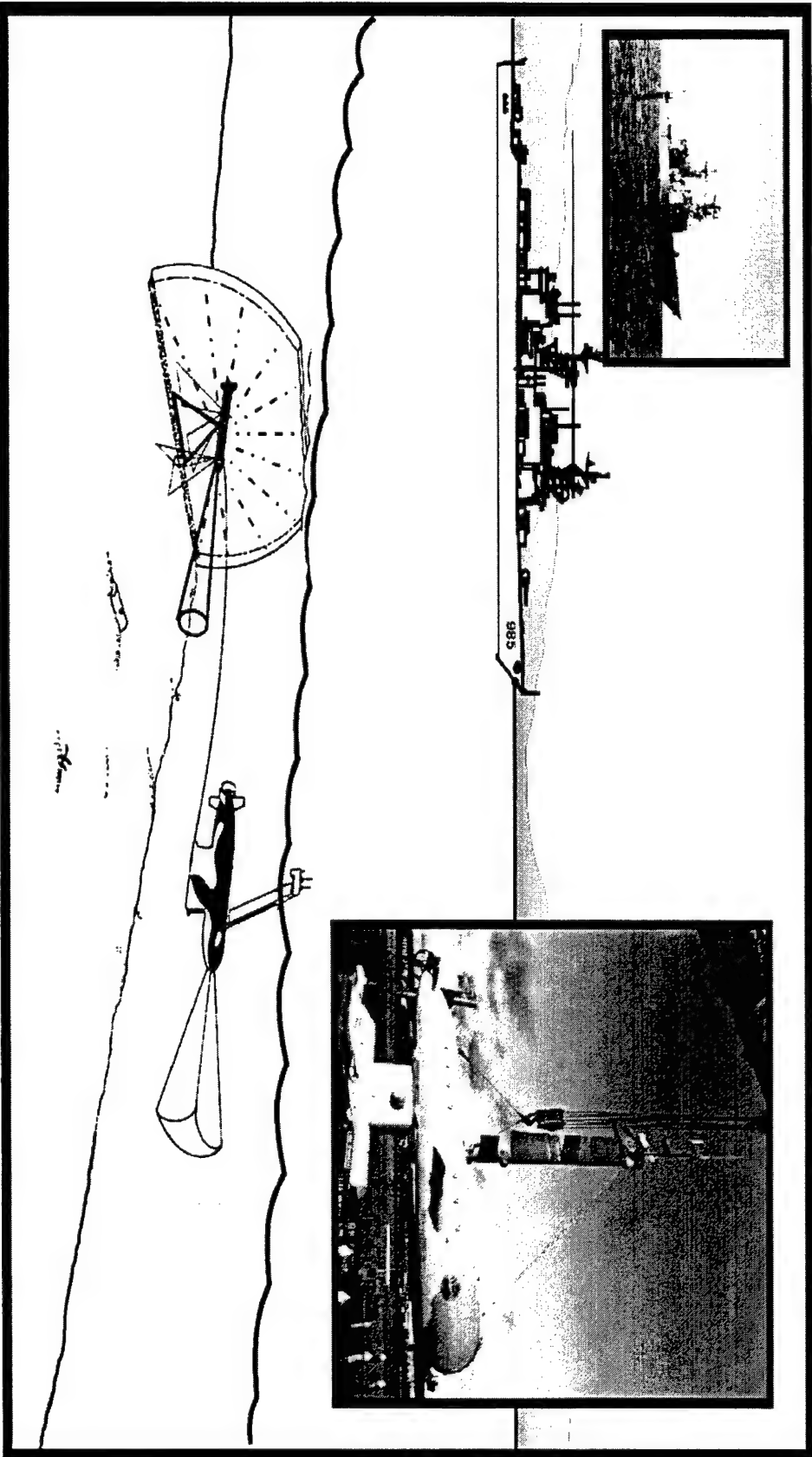
# **Very Shallow Water (VSW) Zone Technology Challenges (cont.)**

---

- Detection and Imaging for Ordnance Identification
- Portable Geodetic-Based Underwater Navigation Equipment
- Detection/Classification of Buried Ordnance
- Low Magnetic Signature Engine  
Diver Propulsion Vehicle
- Signature Reduction of  
Small Boats



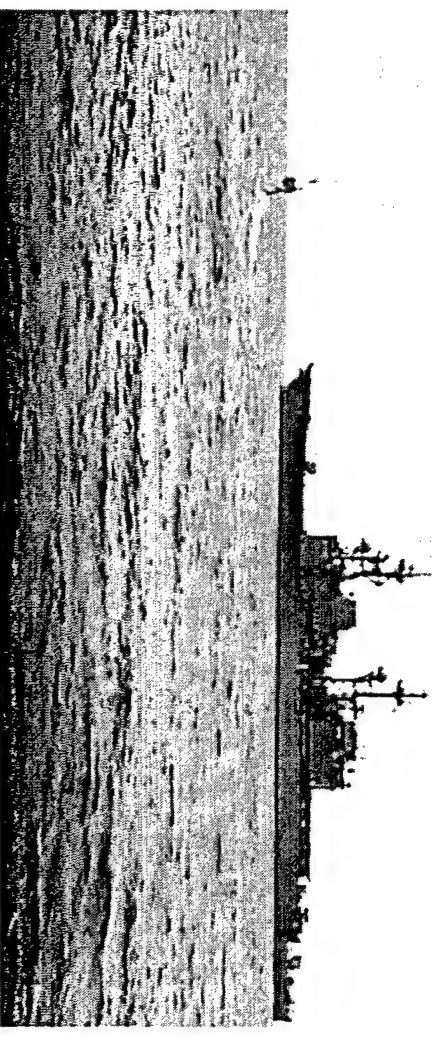
# Remote Minehunting System



# Remote Minehunting System Technology Challenges

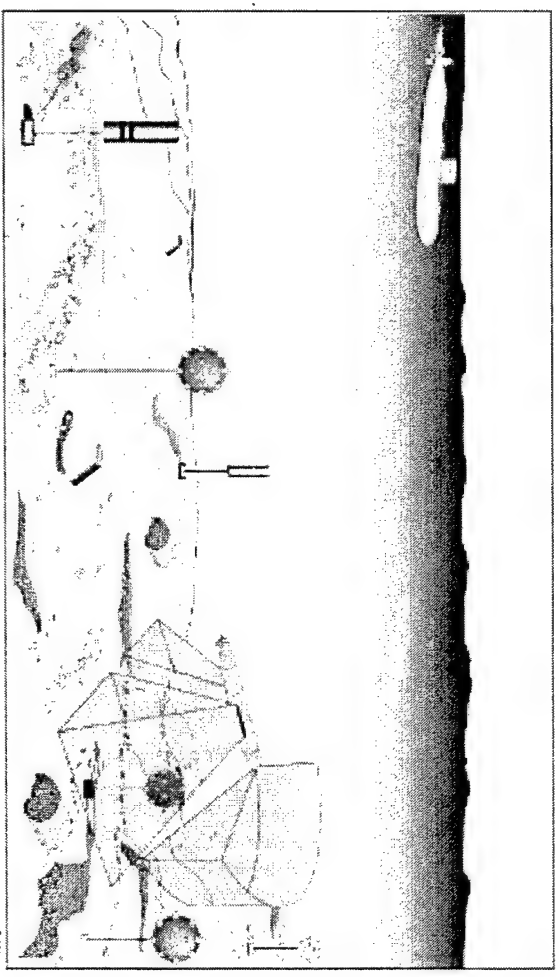
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- Robust Onboard Data Processing
  - Computer Aided Detection/Classification
  - Automated Processes
- OTH High-Data-Rate Comms Capability
- False Alarm Rate Reduction
- RMS Size Reduction



# **Long-Term Mine Reconnaissance System Technology Challenges**

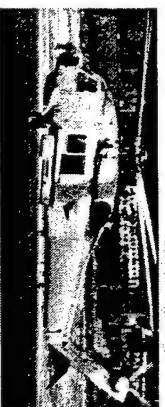
- Robust Onboard Data Processing
- Real-Time/Near-Real-Time Comms to Platform
- False Alarm Rate Reduction
- Power Supply
- Recharge Times



# AMCM Technology Challenges

---

- H-60 Variant for Mine Countermeasures
  - Effectiveness of Organic H-60 AMCM Systems
    - H-60 AQS-20 & SWIMS Tow Capabilities
    - SWIMS to Replace the MK-105 Capabilities
  - Miniaturization of AMCM Systems for the H-60
    - AQS-20 / SWIMS
    - Increased Mission Time On Station
  - AMCM Systems Integration
    - Organic Systems Common Console
    - Integration into H-60 Common Cockpit and Mission Computer Architecture

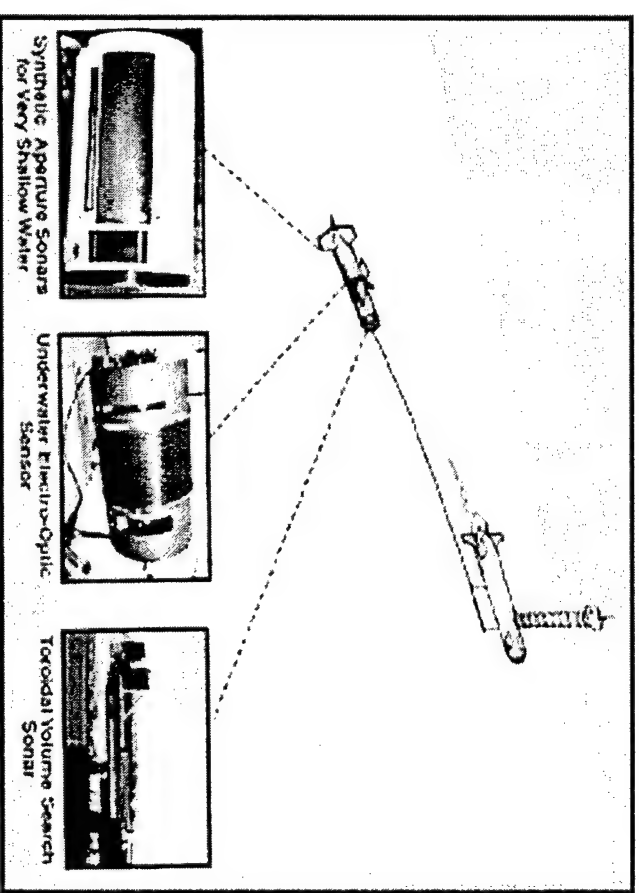




# Future Technology Challenges

---

- Adaptive Sensors and Systems
  - Environmental Adaptability
  - Re-configurable
- Autonomous Vehicles and Behaviors
- Underwater / OTH Communications
- Robotics
- Reducing Total Ownership Costs

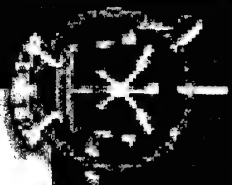


# Summary

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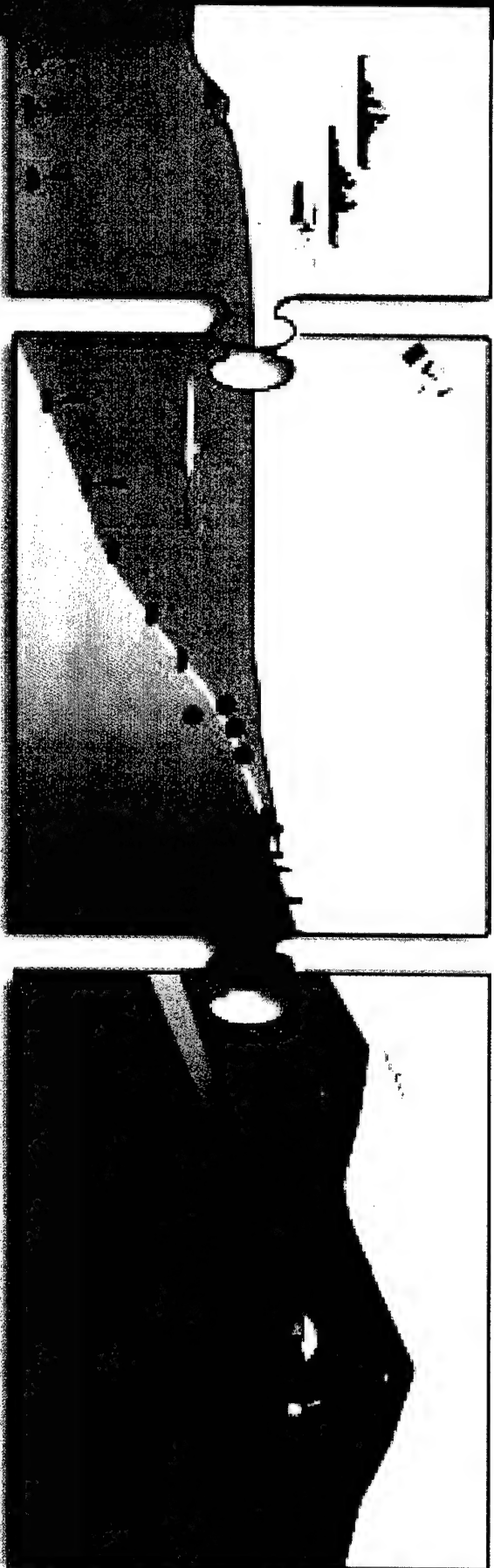
- Mine Warfare Is Becoming a Navy Core Competency
- Navy Maintains Best Dedicated MCM Force
  - Improve MCM Capability in VSW Region
- Fleet Engagement Strategy is Fundamental to Success
- Introduce Organic Systems
- **We Must Manage the Technological Risk**





## *Joint Countermine ACTD Vision*

**Seamless Transition of Countermine Capabilities from Sea to Land Operations**

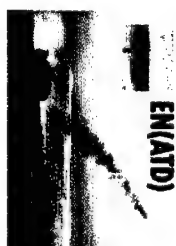


### **Challenge:**

**Demonstrate the Capability to Conduct Seamless Mine Countermeasures Operations with Major Emphasis on Clandestine Reconnaissance/Surveillance from Space/Air/Surface/Subsurface Platforms.**



# Proposed CM Overlay to MARCOMUS 98



Stephenville

John J. Whitfield

LSD

SMCM

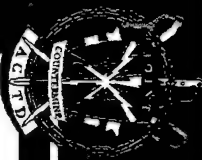
SMCM

LPD

AMCM

LHA





# JCM ACTD Demonstration Objectives

## ATD

### ADVANCED TECHNOLOGY DEMONSTRATION

#### Evaluate Technical Performance

##### Objectives

- Demonstrate Technical Feasibility and Maturity
- Reduce Technical Risks and Uncertainties at Relatively Low Cost

## ACTD

### ADVANCED CONCEPT TECHNOLOGY DEMONSTRATION

#### Evaluate Military Value

##### Objectives

- Gain Understanding of and Evaluate Military Utility Before Committing to Acquisition
- Develop Corresponding Concepts of Operation, Doctrine
- Provide Operational Capability Rapidly

“The primary goal of an Advanced Concept Technology Demonstration is to evaluate the military utility of mature advanced technology(s), and to develop the concept of operations that will optimize effectiveness. This evaluation will be accomplished in a real-time operation, and on a scale large enough to clearly establish operational utility and system integrity.”

—DUSD(AT) Guidelines for ACTD Management Plans





# MILITARY UTILITY ASSESSMENT



## Military Utility Assessment Summary JCM ACTD - CINCUSACOM Military Utility Assessment

Green

### LRS

- Totally clandestine
- Novel technique
- w/existing technology
- Accurate, esp for surface, BZ mines
- Bathymetric value

Red

### NMRS

- Poor nav accuracy
- High false contact rate
- SSN employment
- Fiber optic tether
- No bathymetry

### ML/A

- Partial SZ/VSU success
- UAV suitability
- Bathymetric value

### COBRA

- Processing time
- Large sfc mine only
- Day only
- Optical value
- UAV suitability

### ALISS

- Host platform suitability
- Contact mine survival
- Mine detonation feedback
- Night ops

### IAMC

- Impracticably complex

### ORSMC

- Unvalidated threat

### PowerBlade

- Survivability
- Mobility
- Teleremote operation

### EN-ATD

- Lethality unproven
- Survivability
- Unexploded ordnance
- Host platform avail (sea state)
- Environmental
- Mission Planning software

### ACP

- Undemonstrated (classification)

### CIMMD

- Weight
- Sensory overload
- Ruggedize, w/proof
- Buried, non-metallic

### JCA

- JMCIS dissemination
- Topo display accuracy
- Comm link reliability

### ICOS

- Real time sim
- Complex setup
- Novel system data

### KEY:

PURPLE = JOINT  
BLUE = USN  
RED = USMC  
GREEN = USA

Significant  
Utility Demo'd

Some Utility

Minimal Utility  
Demonstrated

Clandestine/LO  
Reconnaissance

Overt  
Reconnaissance

Sweep

M & S



# Military Utility Assessment (Cont.)

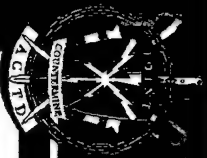
- † JCM is the First Complex System of Systems ACTD
- † An Approach that Blends:
  - ✧ Live Systems Data Analysis
  - ✧ Warfighter Feedback
  - ✧ Modeling and Simulation
- † The Assessment of Military Utility Has Driven:
  - ✧ Exercise Scenario
  - ✧ Data Collection
  - ✧ C<sup>4</sup>ISR Architecture
  - ✧ Joint Countermine Operational Simulation (JCOS)



## Critical Operational Issues

1. Enhance JTF countermine capability during OMFTS
2. Enhance JTF countermine command, control, planning
3. Potential to meet JTF suitability and logistics requirements
4. Enhance planning, rehearsal and analysis through M&S





# CRITICAL OPERATIONAL ISSUE ASSESSMENT (1)

## COI #1 Novel Systems Enhance JTF Countermine Capability

- Clandestine Recon: LRS
- 
- Airborne Overt Recon: ML(A), COBRA, ASTAMIDS
- Low Observable Recon: NMRS, A/S
- Rapid Sweep: ALISS
- Breaching and Land Clearance: EN/ATD, Power Blade, CIMMD



# CRITICAL OPERATIONAL ISSUE ASSESSMENT (2)

**COI #2 Enhanced Command, Control, Planning for Countermine**

- † Joint Countermine Application
- † Common Operational Picture
- † Information Fusion
- † Tactical Planning
- † Information Exchange
- † Integration in the JTF C<sup>4</sup>I Network



# CRITICAL OPERATIONAL ISSUE ASSESSMENT (3)

**COI #3 Potential Suitability Demonstrated by Novel Systems**

- Immaturity of Novel Hardware
- Contractor Vs. Military Operation
- Intended Platform Issues
- † Operational Sequence Demonstrations



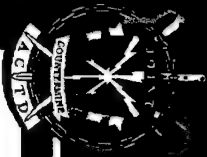


# CRITICAL OPERATIONAL ISSUE ASSESSMENT (4)

COI #4 Simulation Support Operations, Planning, Rehearsal and Analysis

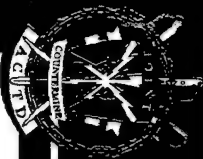
- † Joint Countermine Operational Simulation
- † Operational Staff Planning Tool
- † Demo II Vs Stow ACTD Event
- † Staff Training Support
- † Validity of Represented Systems

•



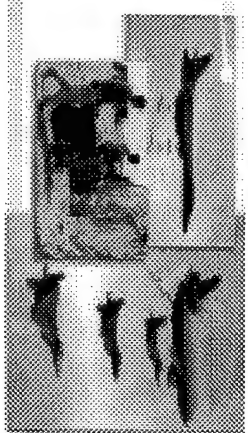
# Related Critical Operational Issues

- Assault Craft/Vehicle Navigation
- Breach Lane Marking
- Communication Link Reliability



## **BOTTOM LINE OBSERVATIONS OF THE JCM ACTD PROCESS**

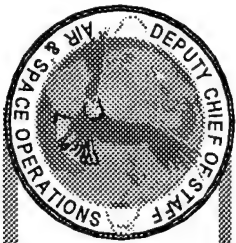
- Military Utility Assessment
- Warfighter-developer Interaction
- Joint Operational Stress
- JCM ACTD Scale
- Future Events



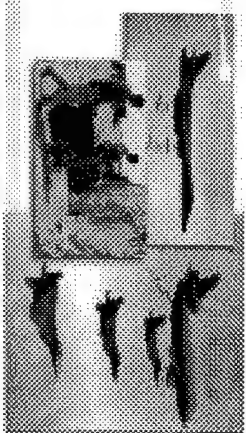
# **Evolving to an Expeditionary Aerospace Force**

## **Concepts and Implementation**

**Major General Larry K. Arnold**  
**Commander**  
**First Air Force**

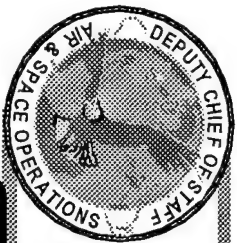


# Purpose and Scope

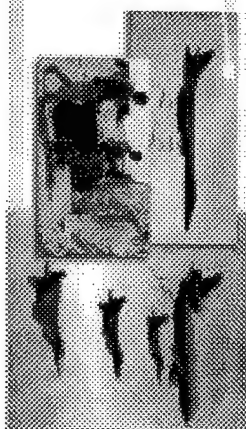


**Describe the operational concept we see as the tool to exploit the inherent strengths of aerospace power in modern warfare**

- **Foundations**
- **Expeditionary Concepts**
- **The Road Ahead**



# Foundations: National Strategies



National Security Strategy

Quadrennial Defense Review

National Military Strategy

Defense Planning Guidance

- **Shape** - the International Environment
  - **Respond** - to the Full Spectrum of Crises
  - **Prepare Now** - for an Uncertain Future
- ~ 1997 National Military Strategy

## Emphasis:

Agile Military Forces  
Rapid, Global Response to Crises  
Peacetime Engagement to Major Theater





# Foundations: Joint and Service Visions



## Joint Vision 2010

- Full Spectrum Dominance
- Operational Concepts
  - Dominant Maneuver
  - Precision Engagement
  - Full-dimensional Protection
  - Focused Logistics

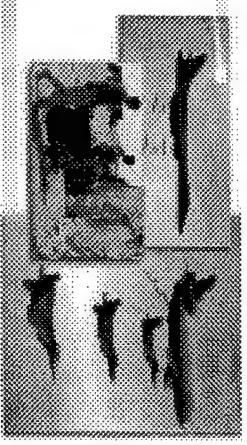
## Global Engagement

- Service Contributions to Joint Warfighting
  - Core Competencies:
    - Air & Space Superiority
    - Precision Engagement
    - Global Attack
    - Rapid Global Mobility
    - Agile Combat Support
    - Information Superiority

**Air Force Capabilities are Fully Integrated  
Key to achieving Full Spectrum Dominance**



## A Changing Military Paradigm

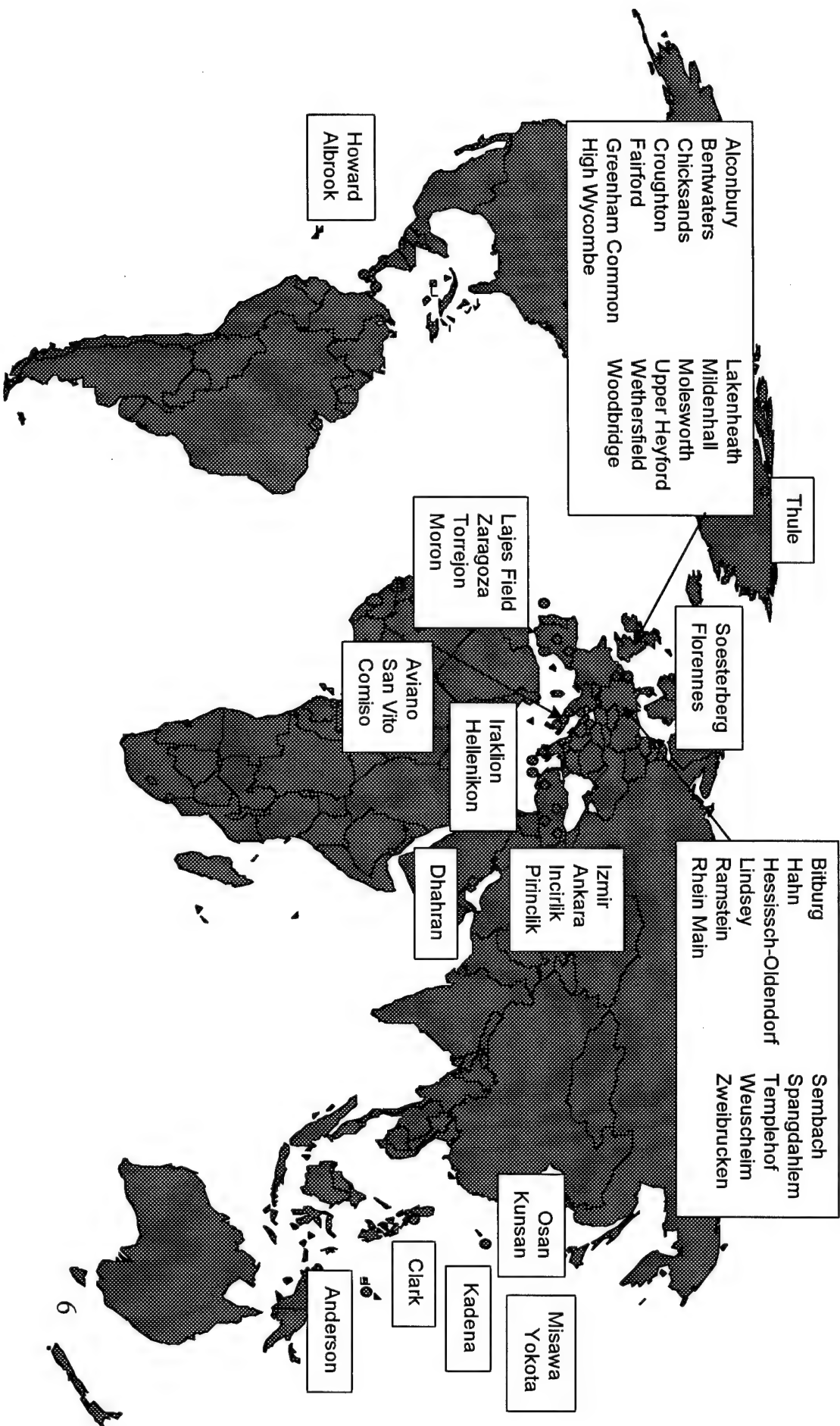
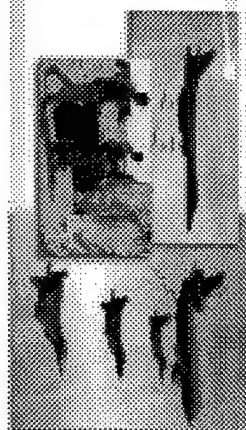


- Cold War Air Force - Focused on **Containment**
  - Garrison State -- robust basing and manning
  - Operating from bases with large infrastructures
- 21st Century Air Force - Focused on **Engagement**
  - Reduced force structure and fewer forward locations
  - Austere operating bases with limited infrastructure
  - Still forward based, but **Responding Globally**
  - Integrated Force Protection & Agile Logistics

**Requires an Expeditionary Approach**



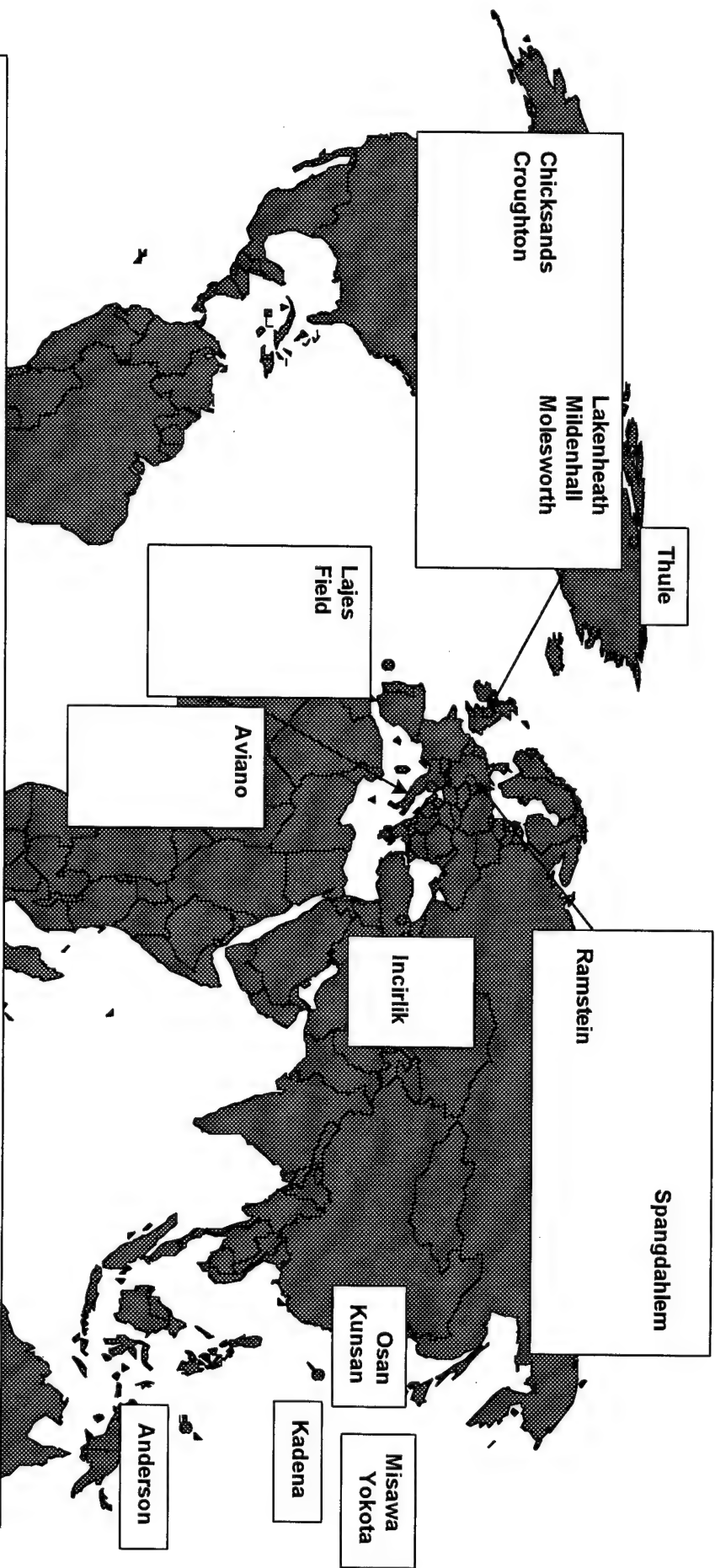
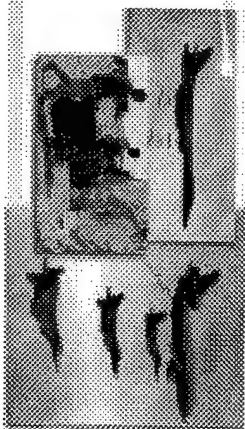
# Overseas Basing During The Cold War







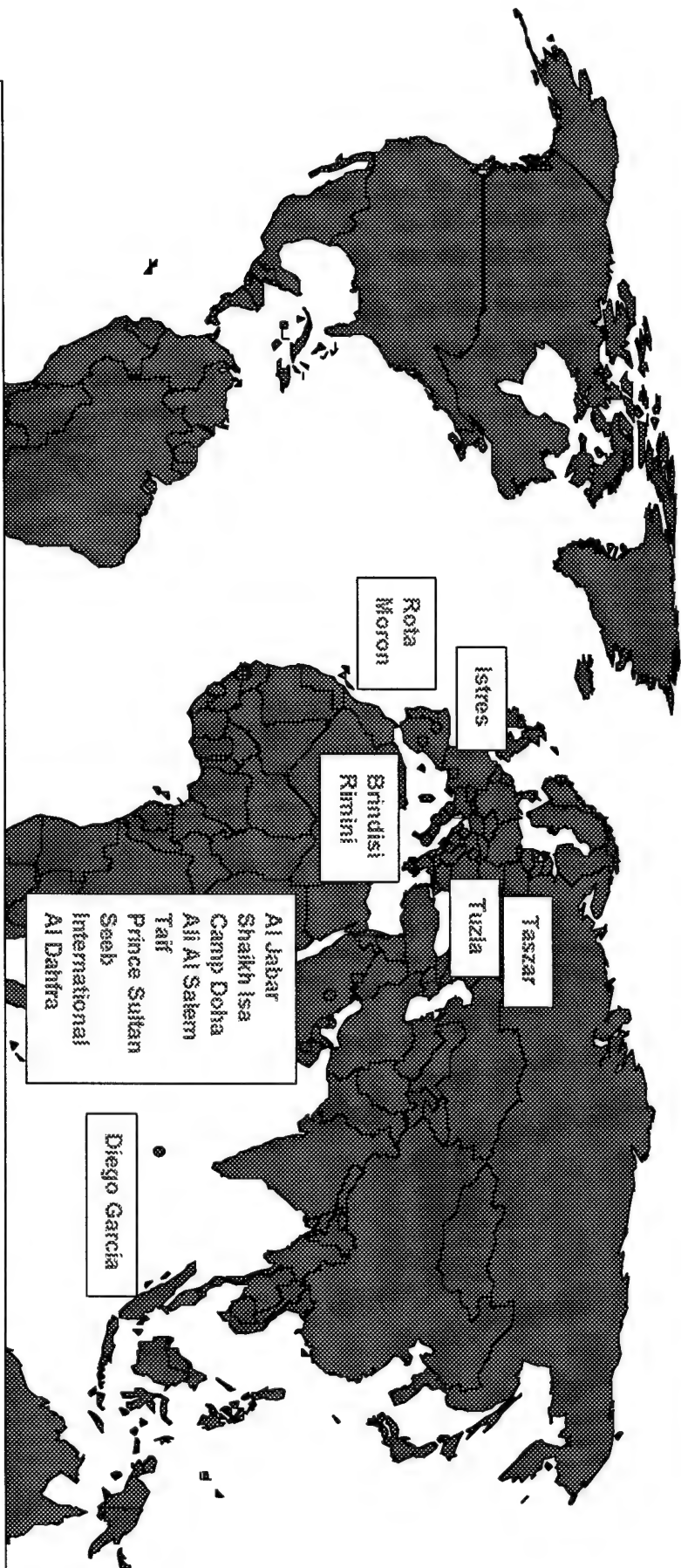
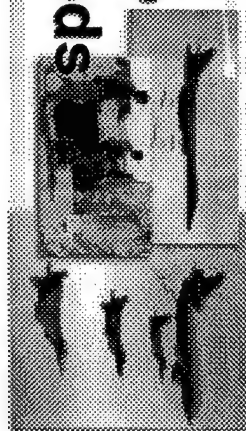
# Today's Overseas Bases



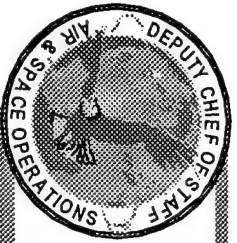
The Air Force has two-thirds less forward basing today than during the height of the Cold War



# The Transition From the Cold War to Meeting Today's National Security Needs



Today's permanent bases must be augmented by temporary basing agreements in order to support the ongoing contingencies in Bosnia and SWA



# We must evolve in a way that...

- Meets National Needs
- Ensures Joint Effectiveness
- Leverages AF Strengths

*Requirements to meet  
the National Military  
Strategy*

## **Relevant Forces**

- Rapidly responsive
- Trained and ready
- Modern and capable
- Lean and agile
- Appropriately structured

## **Expeditionary Aerospace Force**

**WE'RE STARTING NOW!**

*We are operating  
in a . . .*

## **Constrained Environment**

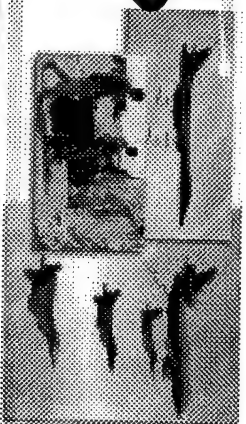
- Fiscal limits
- Political realities
- TEMPO demands
- Qlty of life needs
- Readiness challenges

**Creating a Better 21<sup>st</sup> Century Air Force**





## Terms: What is the EAF?



**Expeditionary Aerospace Force:**  
our vision for how to organize, train and equip to create a mindset and cultural state that embraces the unique characteristics of aerospace power

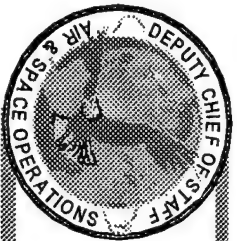
### ■ **Characteristics:**

Range, speed,  
flexibility,  
precision

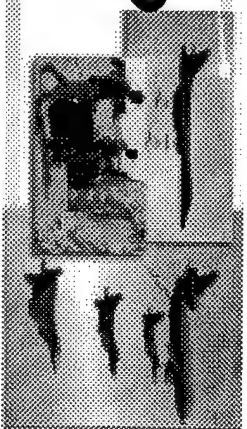
### ■ **Mindset:**

Expeditionary  
AND Warrior

■ **Mission:**



## Terms: What is an AEF?



**Air Expeditionary Force (AEF):**  
a package of Air & Space Forces tailored to meet the needs of a Joint Force Commander

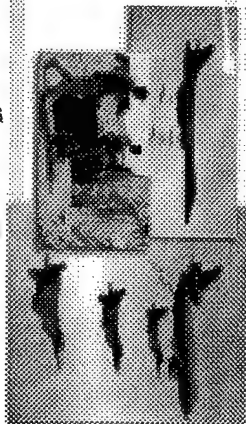
- **Emphasis:** Rapid Response & Employment

- **Relevant Force:** Effects, Size, Capability

- **Full Spectrum of Operations:** Humanitarian Relief to Major



# Concepts: AEF Vision



***Rapidly Executable Course of Action, Tailored to meet a Joint Force Commander's Needs***



**Global  
Attack**

**Air & Space  
Superiority**

**Precision  
Engagement**

**Rapid Global  
Mobility**

**Information  
Superiority**

**Agile Combat  
Support**

**Peacetime Engagement**

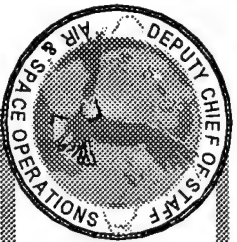
**Spectrum  
of Military  
Operations**

**Creating Strategic,  
Operational &  
Tactical Effects**

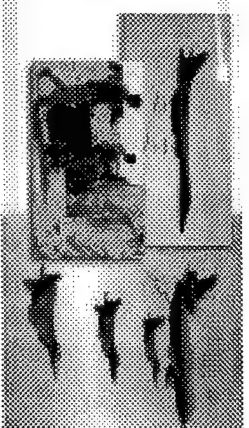
**48 Hour  
Response**

**Major Theater War**



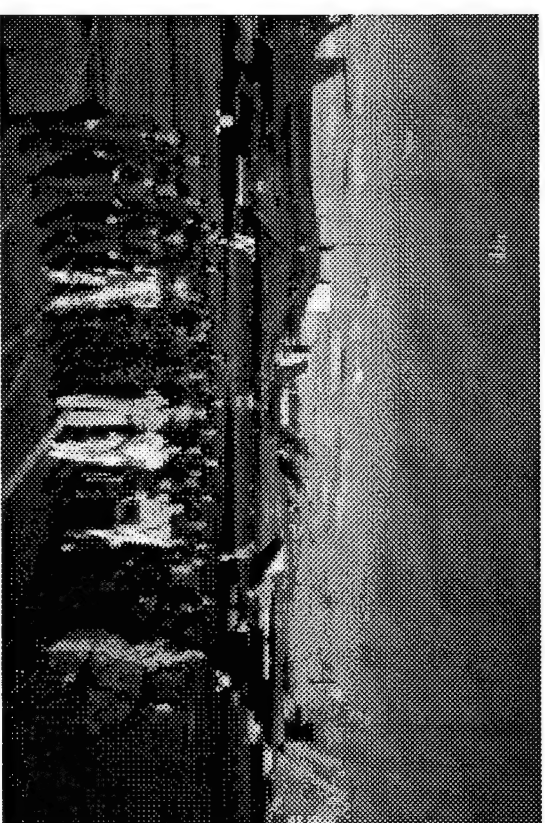
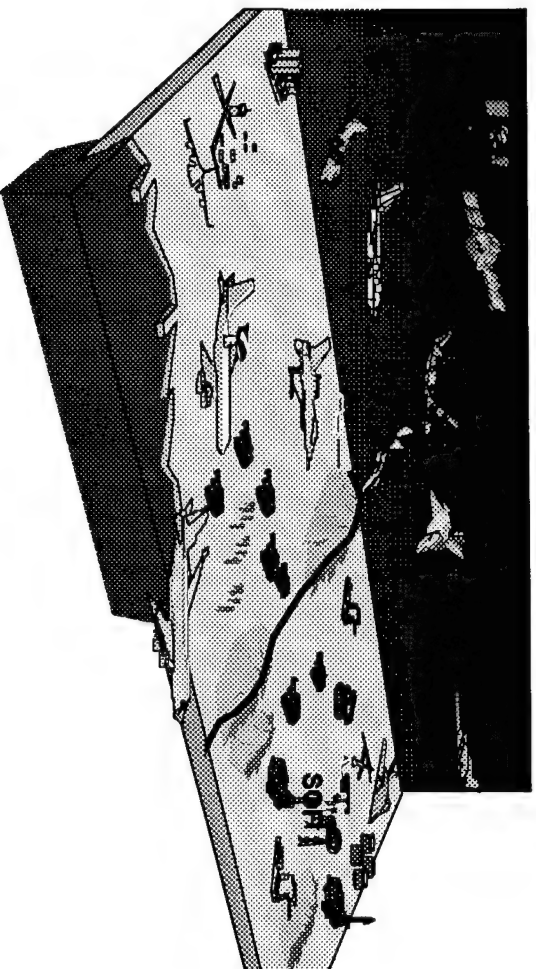


# Challenge: Two Fold



**Preparation of Forces**

**Sustainment of Forces**

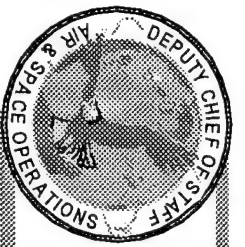


**Trained to Task**  
*For the Warfighter*

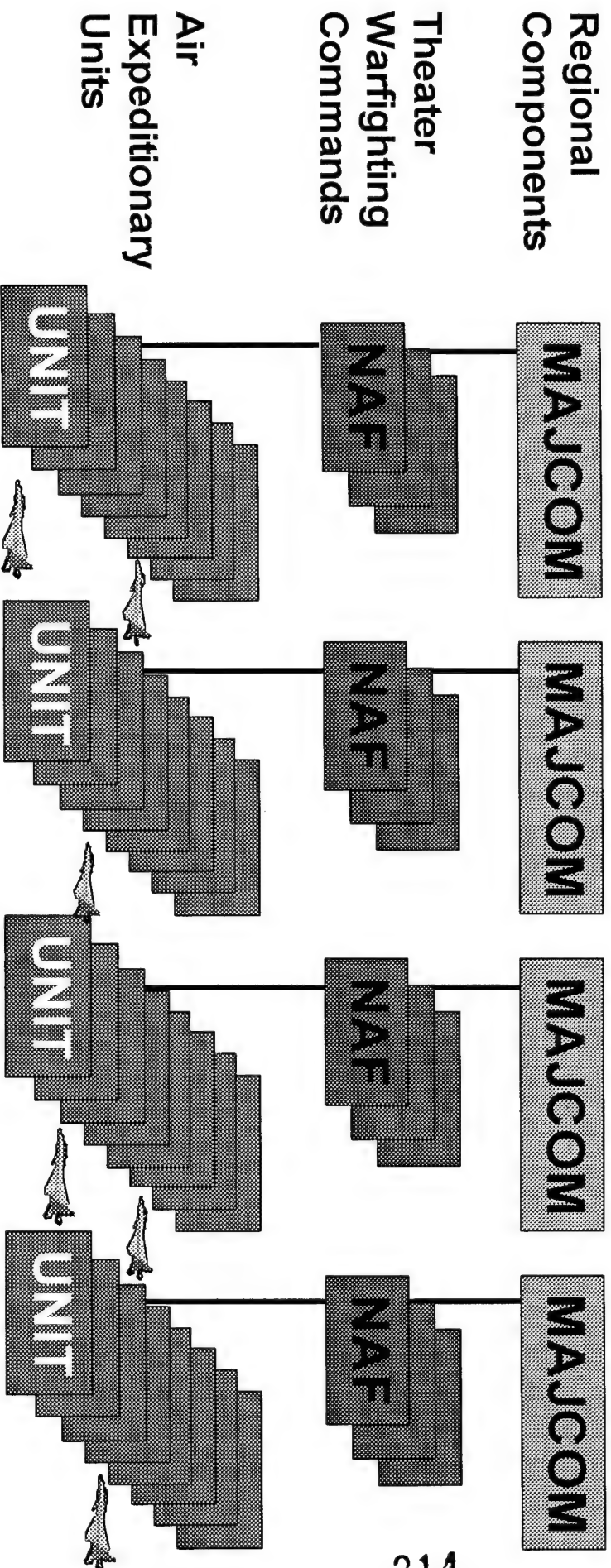
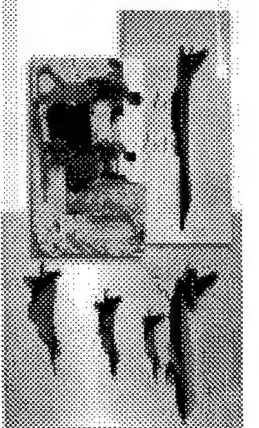
**Total Force Integration**  
*For the Air Force*

**More Responsive Aerospace Power for CINCs**





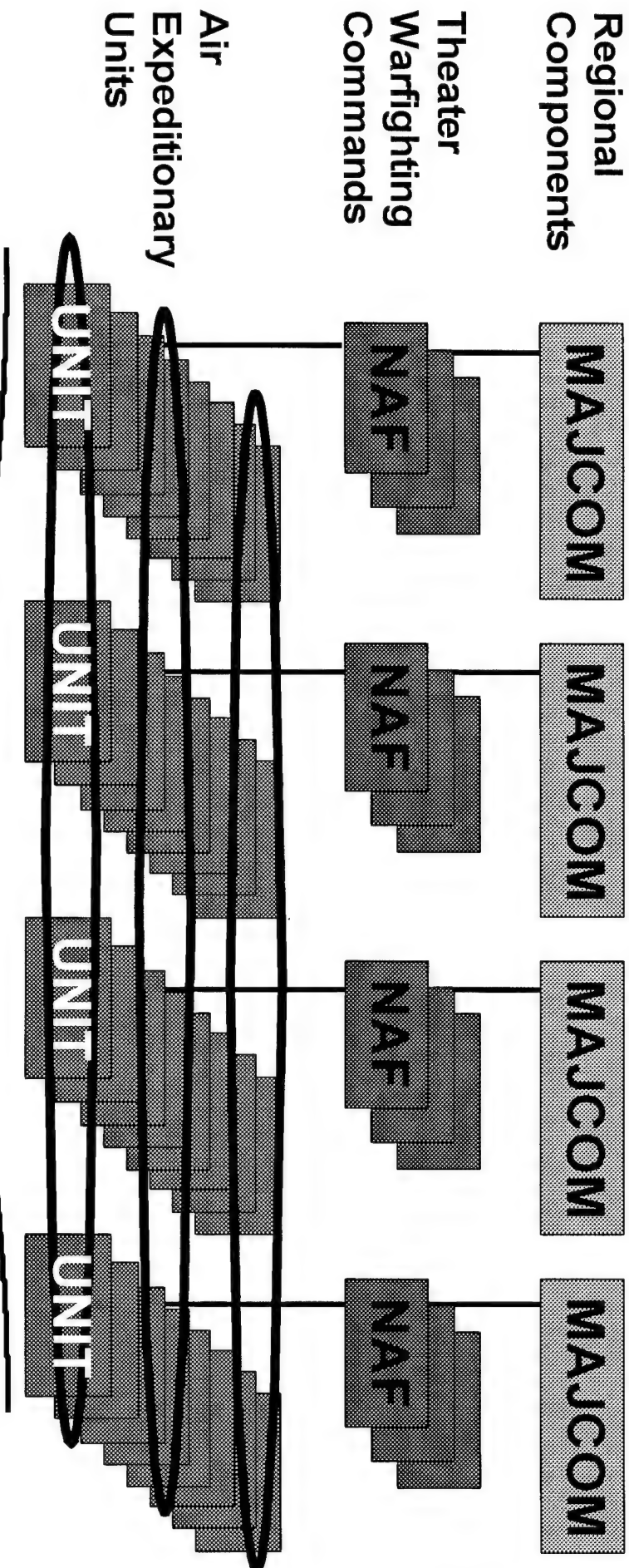
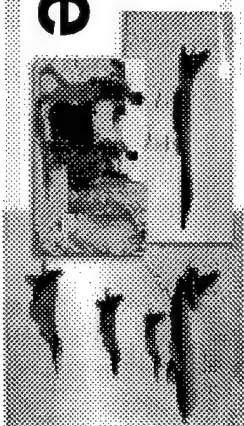
# Today's Air Force Organizational Structure



NAF = Numbered Air Force



# Tomorrow's Air Force Organizational Structure

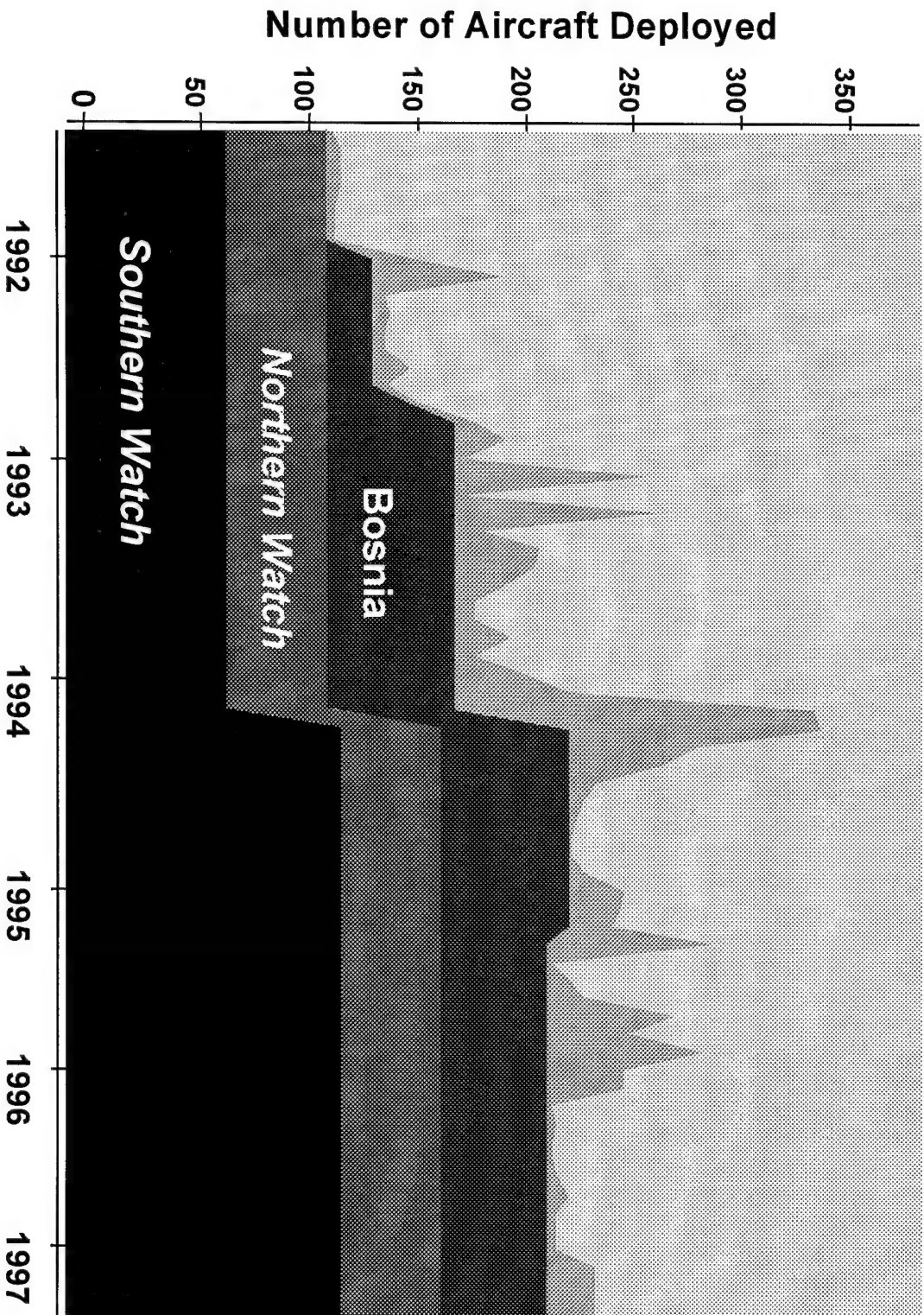
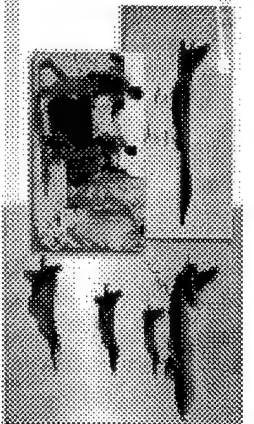


10 Air Expeditionary Forces -- A Total Force Solution



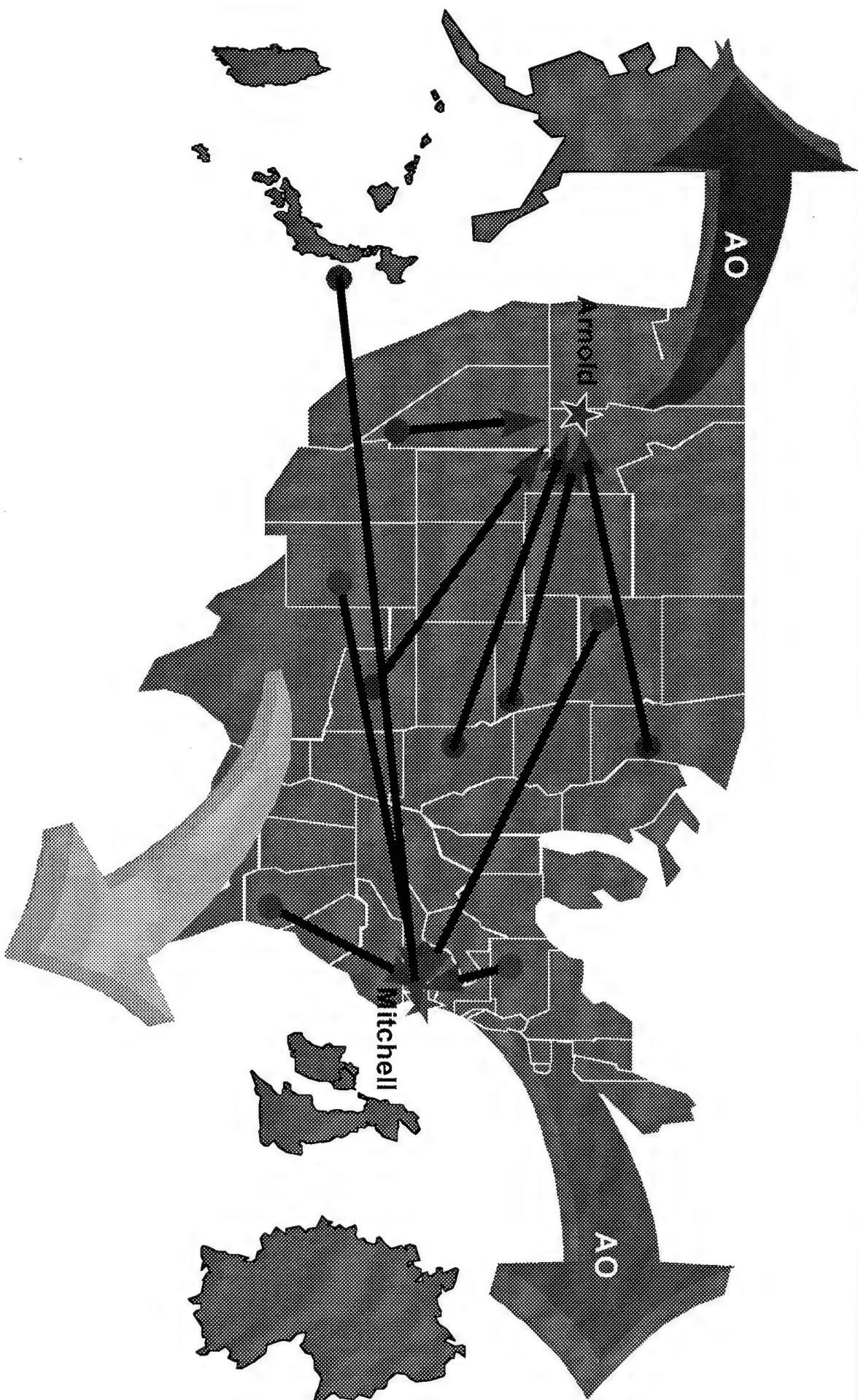
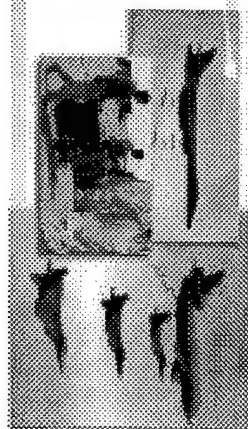


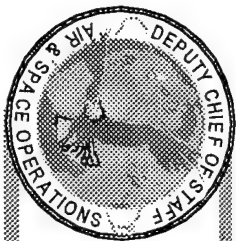
# Framing the Operational Requirement



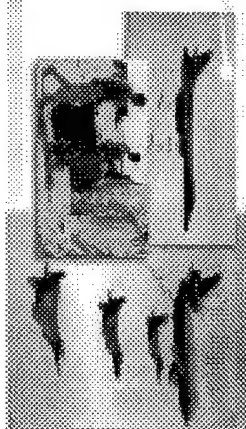


# Notional AEFs 1 and 2 (Mitchell & Arnold)

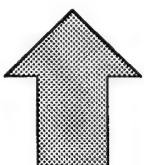




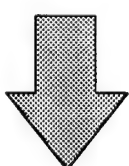
# Core AEF Concept



**Forward Deployed**  
Fighter  
Tanker  
TAC Airlift  
ISR  
OSA  
Space  
(Bombers)



**On Call**  
Fighter Bomber  
Tanker Stealth  
CSAR ISR  
C2 OSA  
TAC Airlift Space



**High Demand/Low Density**  
E-3 U-2 EC-130  
E-8 RC-135 CSAR  
Ground Systems (GTACS)

**Contingency Response**  
National Command Authority Scheduled Taskings  
Military Crisis NEO  
Disaster Relief Humanitarian Assistance

**SHAPE**

**Full Force is Tailorable / Responsive**

**RESPOND**

Operations  
Other Than  
War

Smaller Scale  
Contingencies

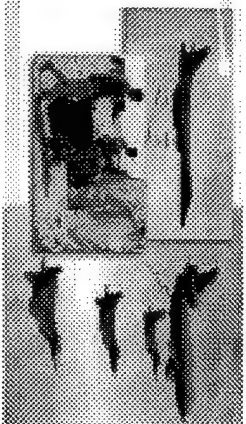
Major  
Theater  
Wars

**Spectrum of Conflict**





# AEF Force Composition (Notional)



Forward Deployed	Capabilities	On Call
18 x F-15C	Air-to-Air	6
10 x F-15E	PGM	14
8 x F-16CJ	SEAD	10
12 x A-10 (6 Units)	Anti-Armor/CAS	14 (ANG) *
3 x E-3	Surveillance/C2	0
3 x HH-60	CSAR	9
8 x C-130 (2 Units)	Intra-Theater	10 (ANG) *
4 x KC-10	Air Refueling	2
3 x KC-135 (2 Units)	Air Refueling	7 (AFRC) *
3 x KC-135 (2 Units)	Air Refueling	7 (ANG) *
3 x C-21A	Transportation	6
0 x B-52/B-1	CALCM/SA	6
0 x B-2	Stealth	3
0 x F-117	Stealth	6

75

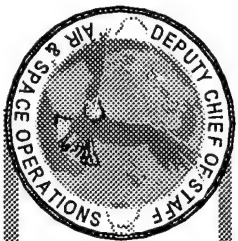
175 Total

100

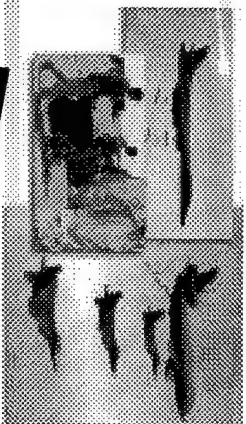
*High Demand/Low Density Assets Tasked A/R*

E-3, E-8, U-2, EC-130, RC-135,  
CSAR, Ground Systems (GTAC\$)

\* Additional aircraft  
may be available  
with Presidential  
Selective Reserve  
Call-up



# AEF Rotational Cycle (CAF only - Interim)



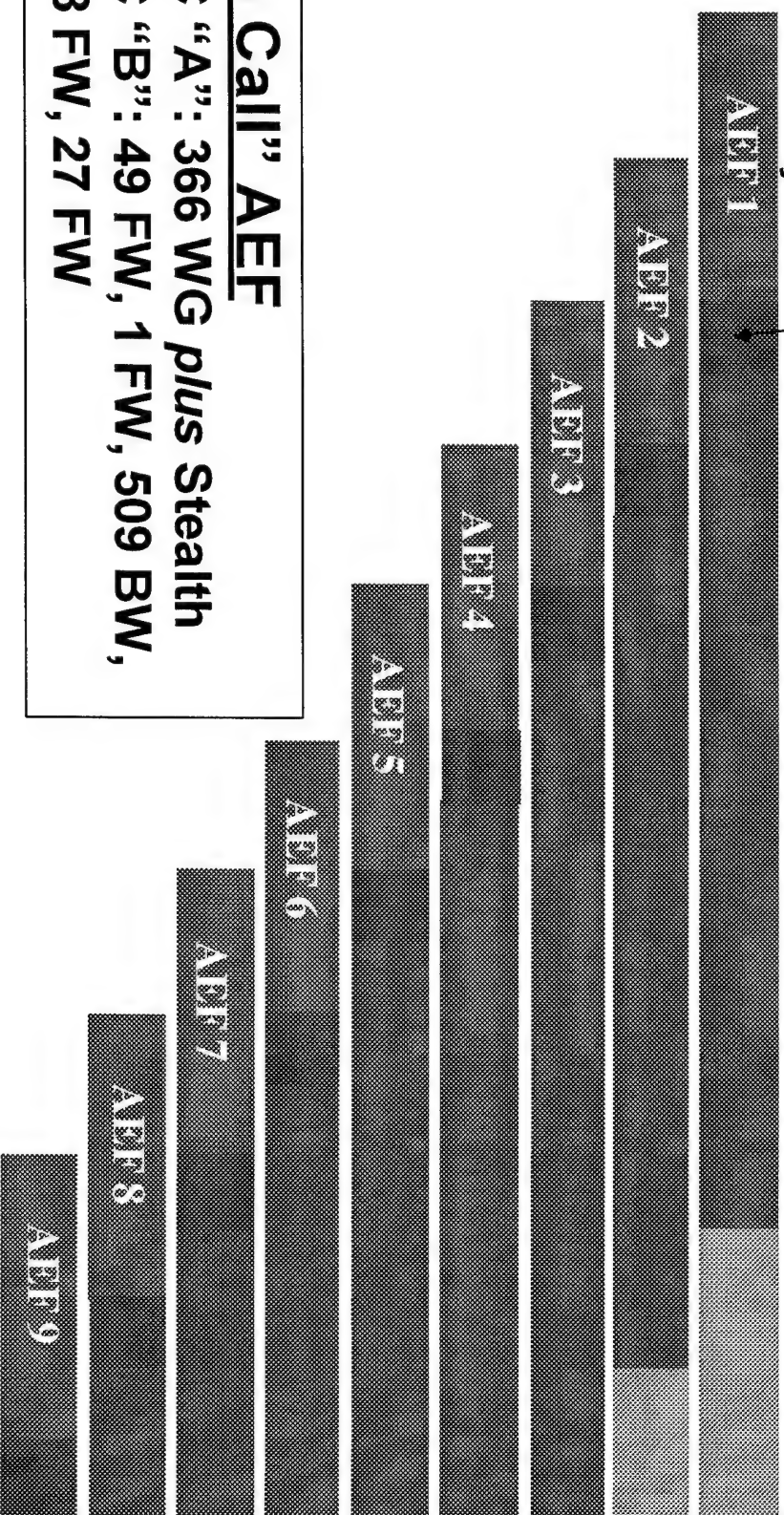
13.5 Month Cycle



Deploy/On Call Stand-down  
90 Days

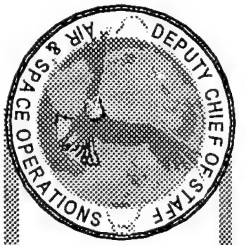
Normal Training and Exercises

Spin-Up/  
Deploy Prep

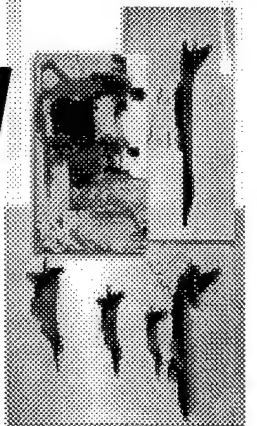


## "On Call" AEF

- OC "A": 366 WG *plus* Stealth
- OC "B": 49 FW, 1 FW, 509 BW, 388 FW, 27 FW



# AEF Cycle



**15 Month Cycle**

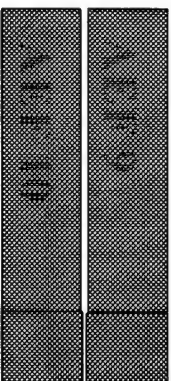
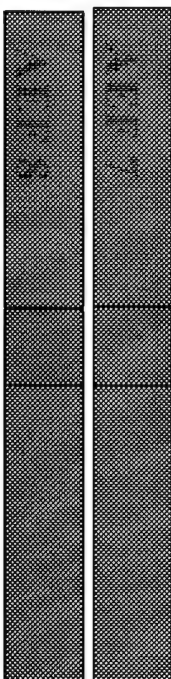
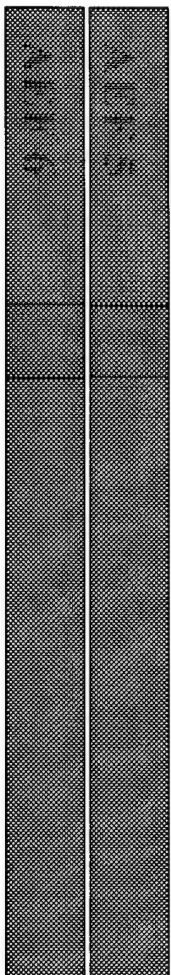
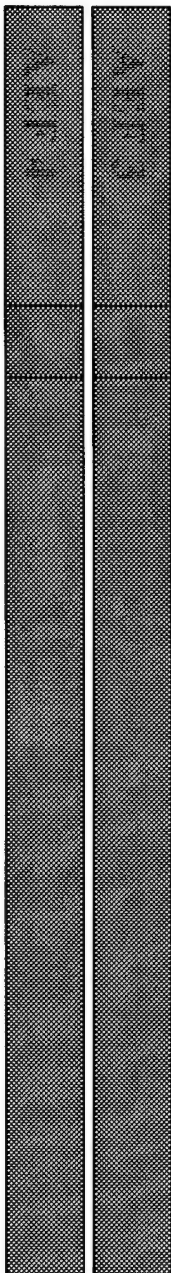
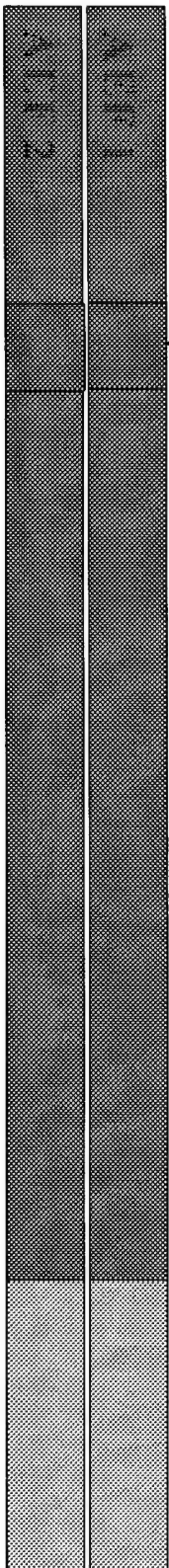


Standdown

Deployment/On Call

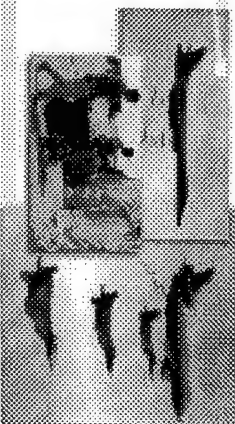
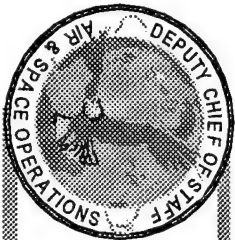
Normal Training and Exercises

Spin-Up/  
Deploy Prep

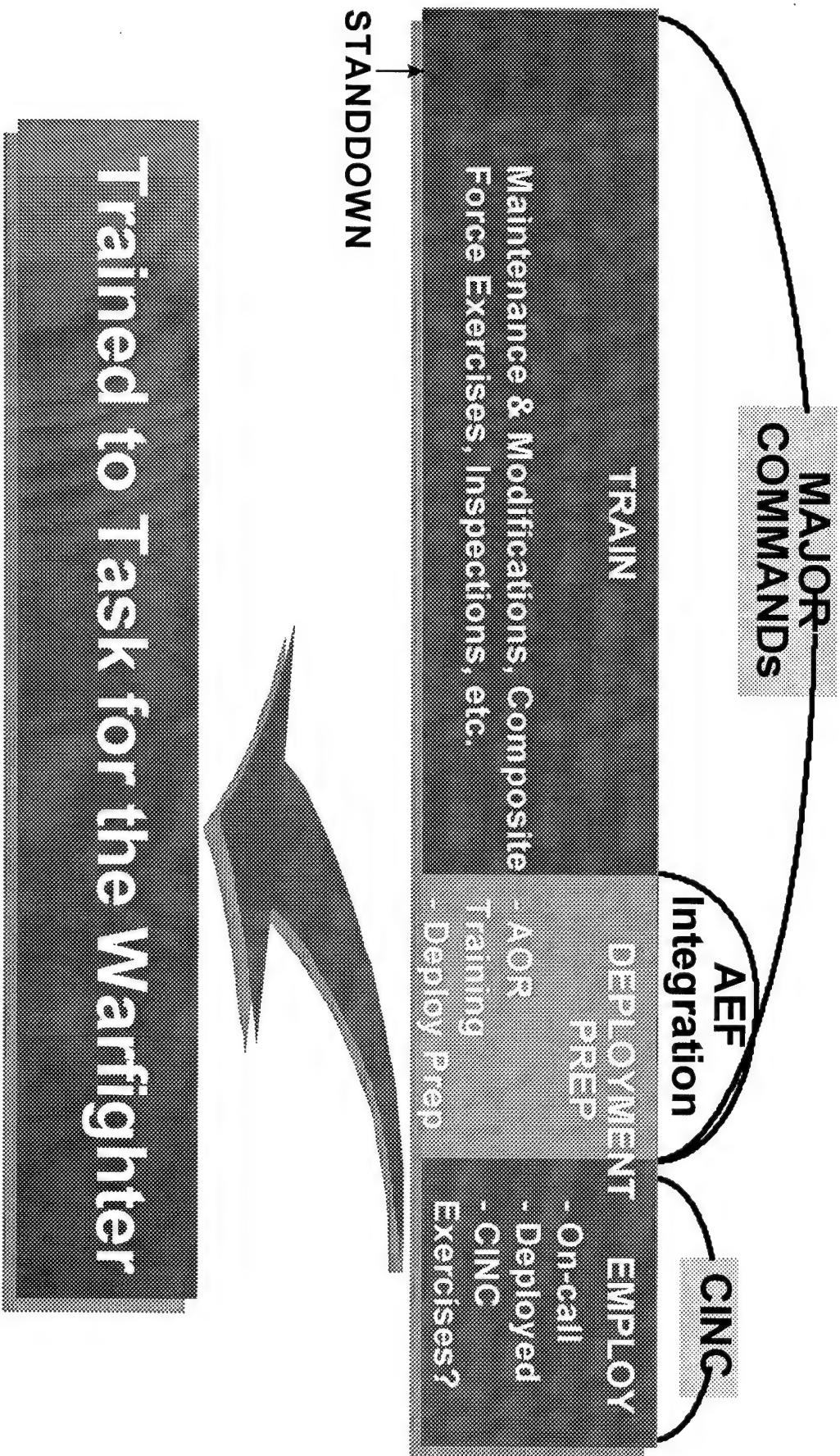


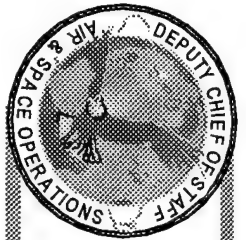
**EAf Rotational Cycle**



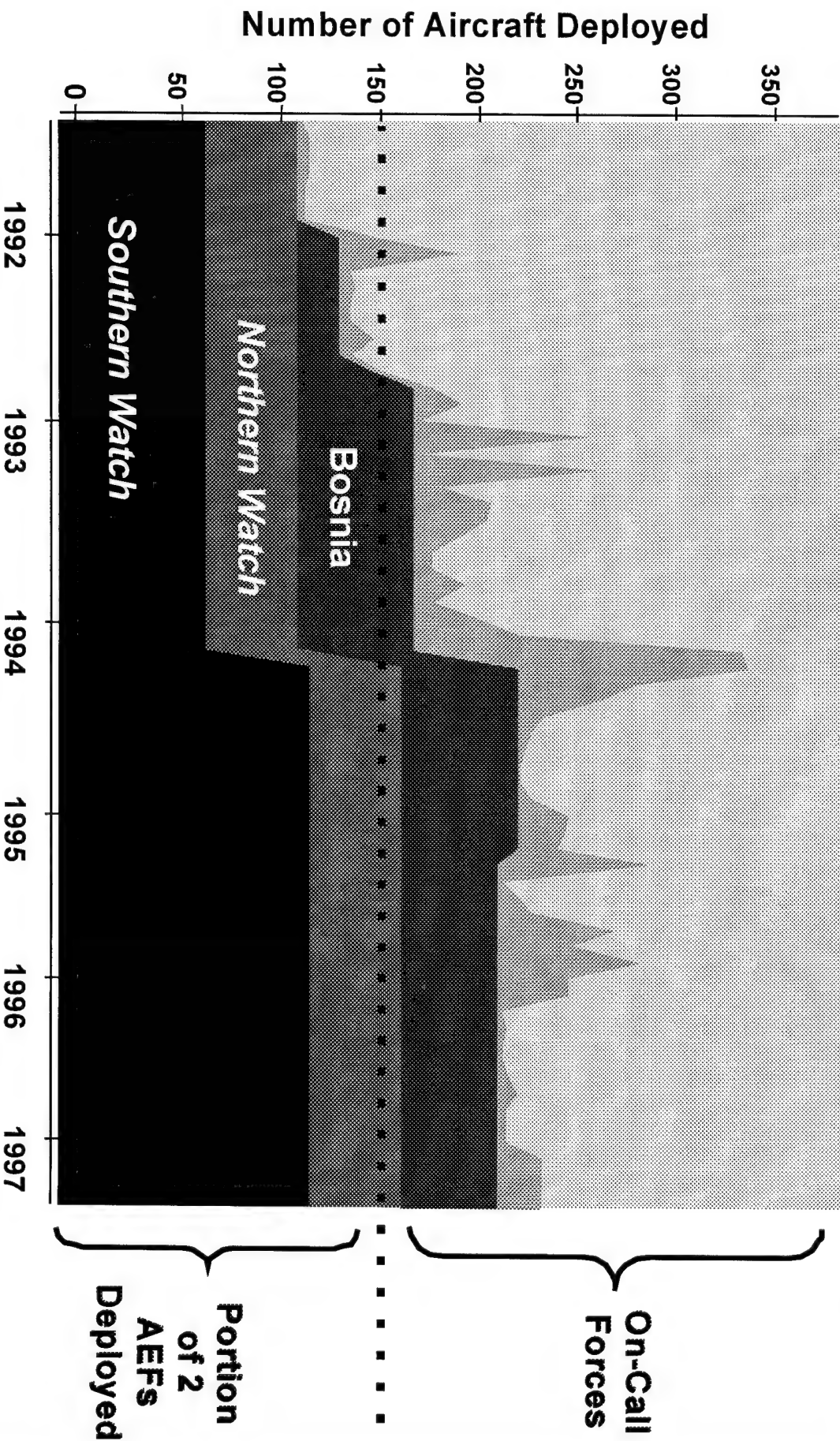
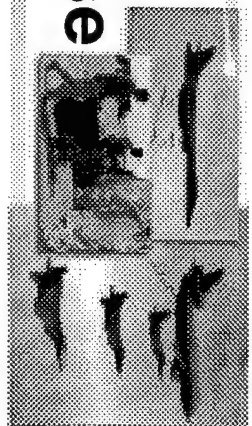


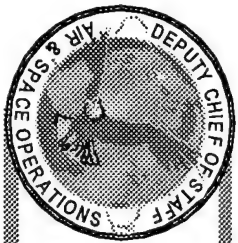
# Life Cycle of an AEF (notional)



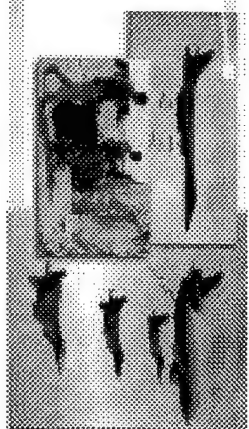


# EAF Concept Covers On-going Contingencies and Crisis Response





# Sizing Support for EAF Concept

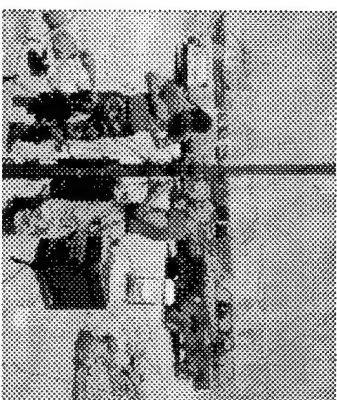


## Large Team Taskings

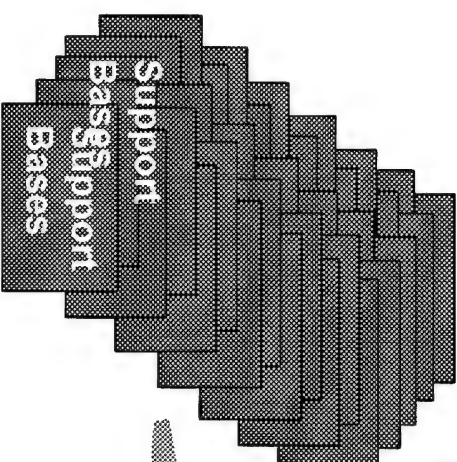
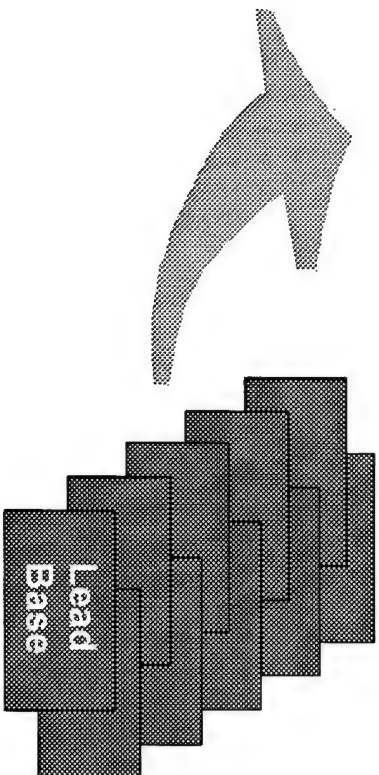


Fire Fighters  
Medical Teams  
Security Forces  
etc.

## Small Team Taskings



Comm/Computers  
Transportation  
Services  
Supply  
etc.

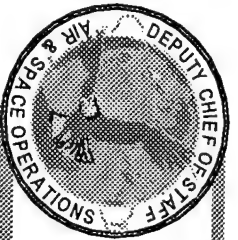


Sources: Robusted Lead AEF Bases

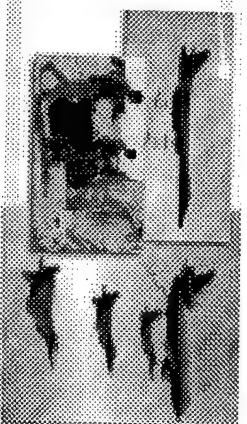
Sources: Robusted Other AEF Bases

5000+ Support Personnel



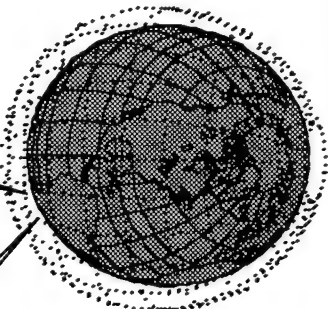


## Future Distributed JAO Operations - An Example -



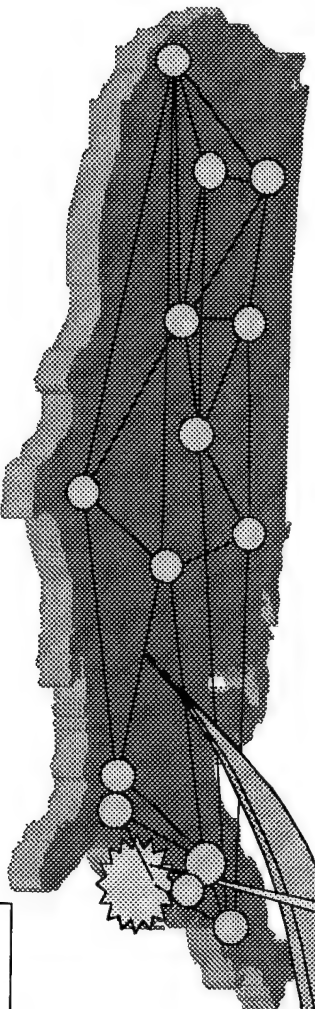
### Expeditionary Benefits

- Reduced Footprint
- Reduced Security Force reqs.
- Reduces early Airlift reqs.
- Facilitates options development
- Facilitates mission rehearsal



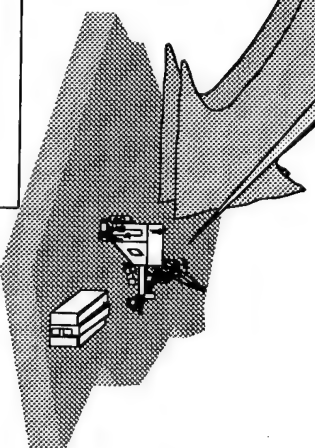
### Today's Requirement:

- 1500-2000 people
- 10-15 days to deploy
- 25 C-17 loads



### Future Requirement:

- ~ 125 People
- 24 - 48 hr response
- 1-2 X C-17 Loads



05/27/98 08:19

# Expeditionary Aerospace Force

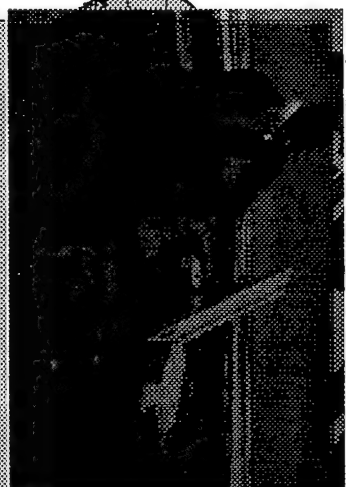
## Our Vision

### STRUCTURE



- Organize Total Force into standing Air Expeditionary Forces (AEF)
- AEFs provide a more stable, predictable, and available force

### CULTURE

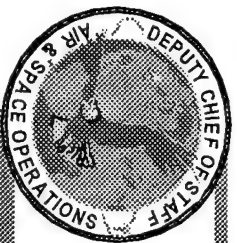


- Men and women with an "expeditionary and warrior mindset" who understand our mission is global
- Bold, Decisive Leaders who excel in austere, unpredictable environs

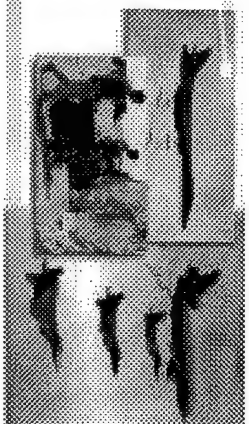
### INNOVATION



- Creative approaches and new technologies which make us light, lean, and lethal
- Rapidly employable World-wide



# Expeditionary Aerospace Force



***What it is . . .***

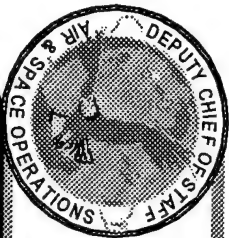
- Rapidly responsive forces
- Lighter, leaner and more lethal
- Tailored forces for CINCs
- More stable, predictable, and available forces
- An integration of our *Total Force*
- An institutionalized Expeditionary Culture

***What it is not . . .***

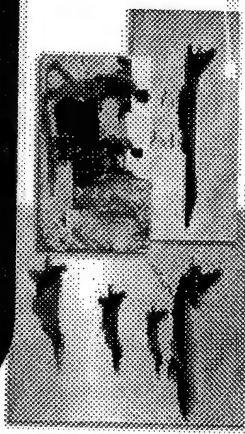
- A risk to CINC OPLAN support
- A change in baseline organizational structure
- Tiered readiness
- A substitute for BRAC

**A Better Use of Aerospace Power  
for the 21<sup>st</sup> Century**





## The Road Ahead

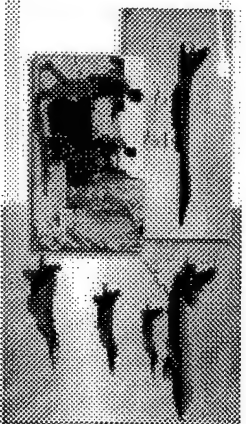


**Chief's Vision: evolve the Total Force to an "Expeditionary Aerospace Force (EAF)"**

- **Clear Guidance:** "Operationalize the EAF Concept by January 2000"
- **Plan of Attack:** Policy, Planning & Execution
- **Leadership:** stand up new AF/XO Directorate
  - "Director of EAF Implementation" ★★
  - Develop policy, guidance and **Lead** the Total Force EAF Implementation effort



# EAFF Concept Advantages



## To CINCS

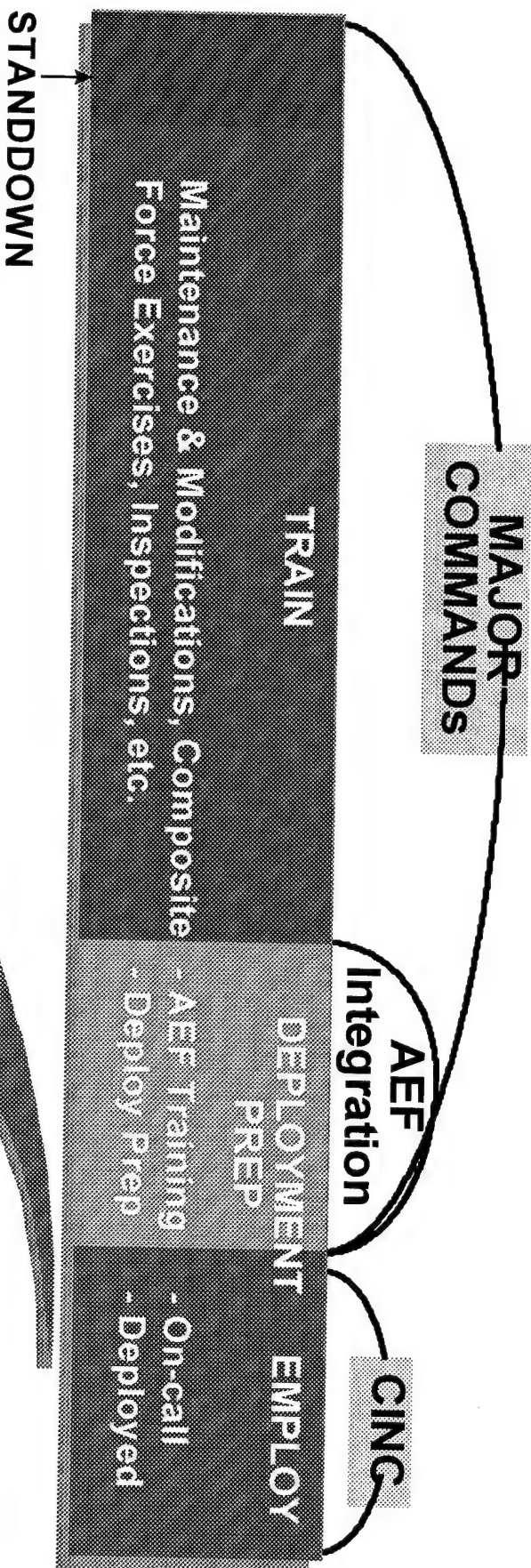
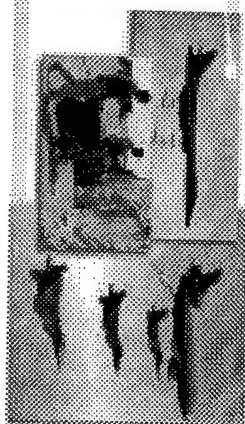
- ✓ Robust Deployed Forces
- ✓ Rapid Response On-Call Forces
- ✓ Tailored Forces to Meet "Shape" and "Respond" Requirements
- ✓ Full Spectrum of Capabilities
- ✓ Future: Improved Support to OPLANS

## To Airmen

- ✓ Employs *Total Force*
- ✓ More *Predictable, Stable* Schedule
- ✓ Improves *Support Structure*
- ✓ Benefits Achieved *Without Major Structural Change*



# Life Cycle of an AEF (Notional)



Operations  
Other Than  
War

Smaller Scale  
Contingencies

Major  
Theater  
Wars

Spectrum of Conflict

# **Strategic Preclusion Through Advanced Full Dimensional Operations**



**A simultaneous, decisive and joint approach to crisis  
response and resolution**

Deputy Chief of Staff for Doctrine

United States Army Training and Doctrine Command



# Strategic Preclusion

## Endstate Defined

**Rapid and decisive Joint Force contingency response to crises, terminating them in their early stages or placing an opponent at an early, continuing and decisive disadvantage—strategically precluding escalation. . .**

**Retains or restores stability and saves lives and national treasure**





# Advanced Full Dimensional Operations

Rapid and simultaneous application of Joint military capability, centered on complementary application of *INTERDICTION* and *MANEUVER*, achieves such dominance across all military dimensions that Red is unable to set the conditions in his favor and is at such a disadvantage the he concedes early or is set up for failure in the face of follow on forces.

*Achieved through Evolutionary steps to  
Simultaneous Operational Maneuver & Interdiction  
followed by Revolutionary steps to Simultaneous  
Strategic Maneuver and Interdiction*





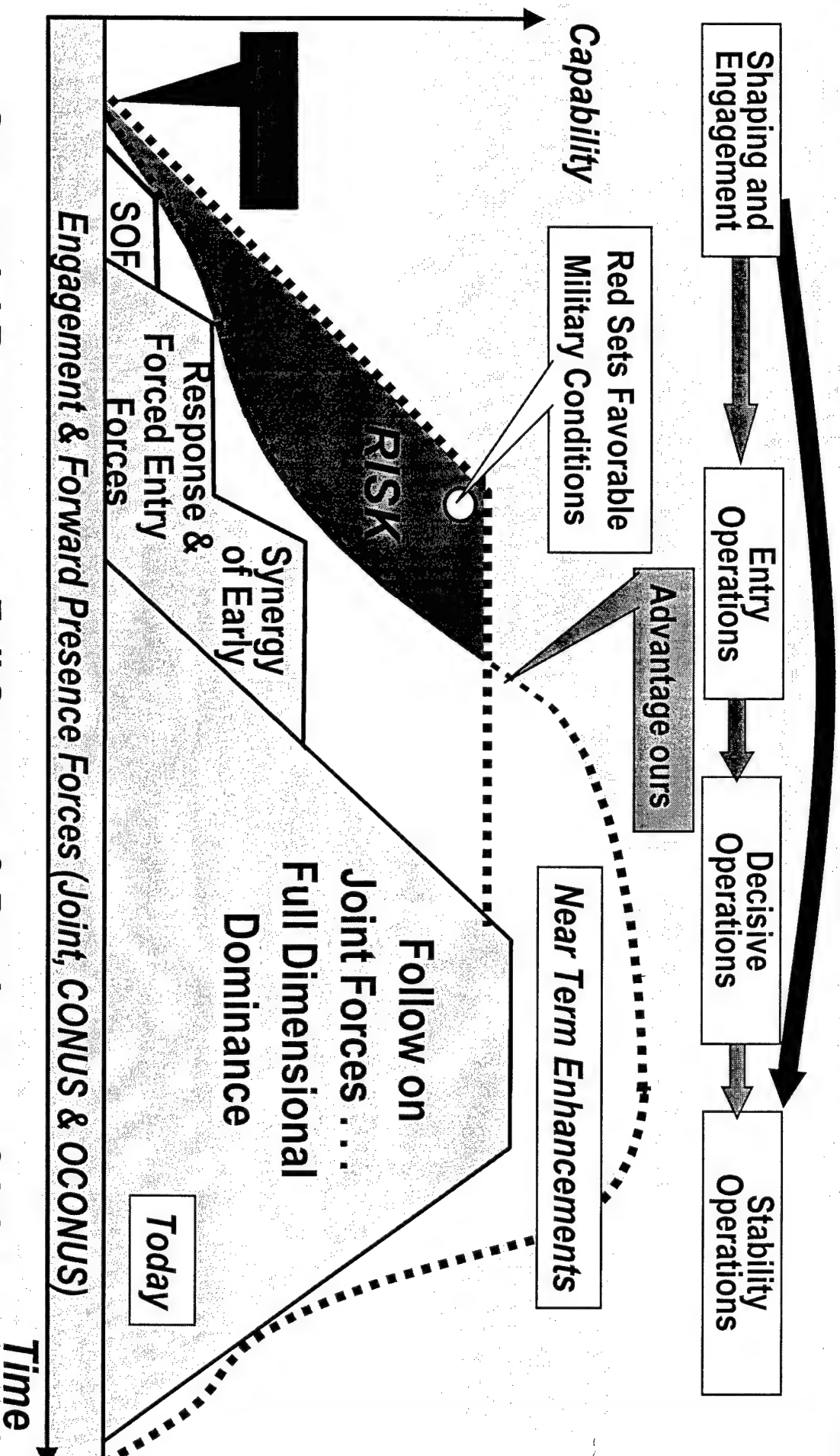
# Warfighting Insights

- Crisis Response Force Projection Speed and Decisiveness is key to crisis/conflict resolution
  - Rapid
  - Lethal, Agile, Immediately into the fight
- USAF & Naval Interdiction reach & response will continue to increase operationally and strategically
- One dimensional approaches easily countered
- Army After Next Insights demonstrate Value/Decisiveness of:
  - Seamless integration of complementary Interdiction and Maneuver
  - Immediate and simultaneous dominance of all Battle Field Dimensions . . . Advanced Full Dimensional Operations

"Interdiction and Maneuver . . . complementary operations designed to achieve the AF's campaign objectives . . . Potential responses to synchronized maneuver and interdiction can create an agonizing dilemma for



# Crisis Response Power Projection Challenge



Sequential Response . . . Full Synergy & Dominance of Joint Capabilities Unrealized until completion in force Build Up



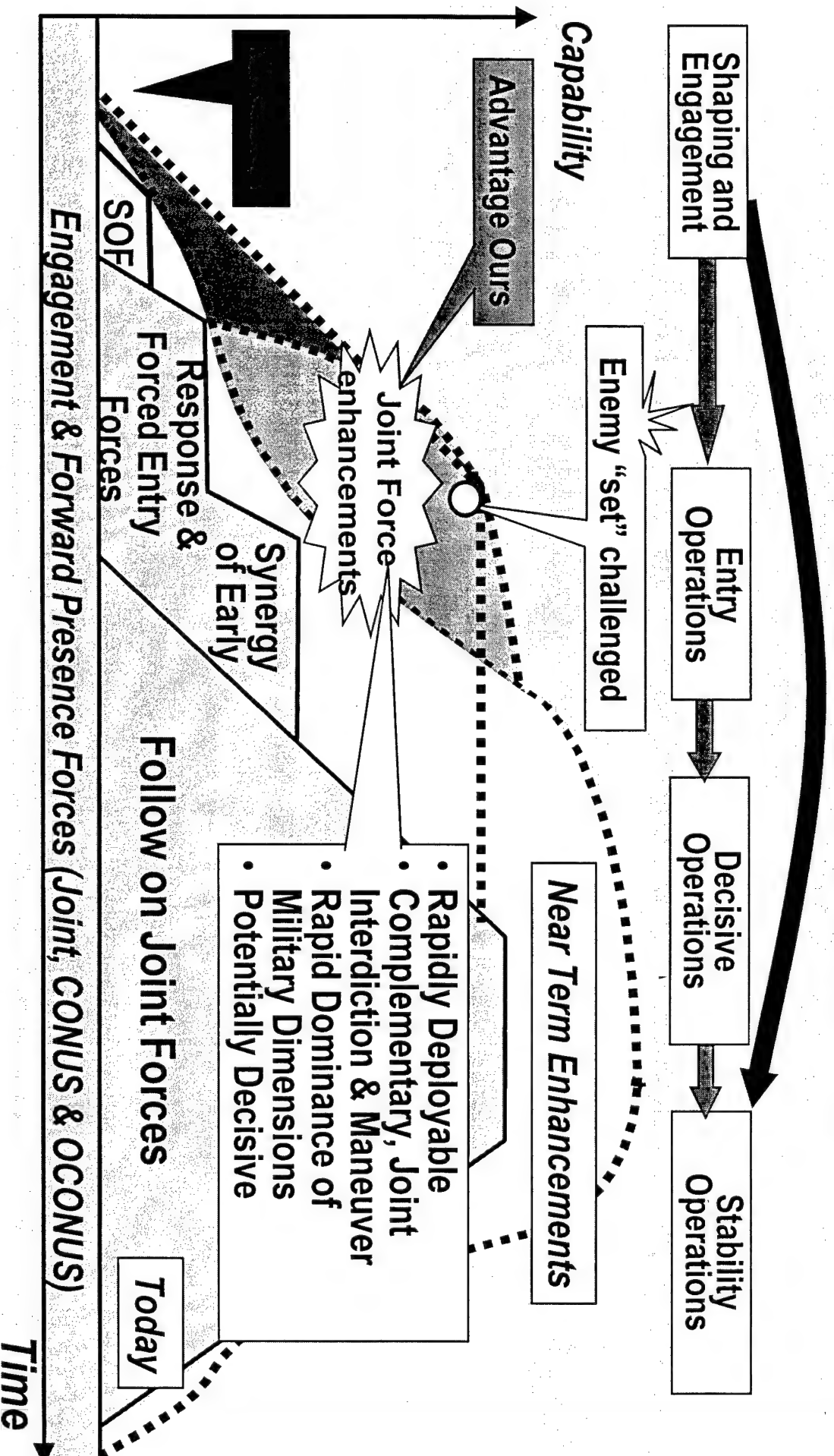
# Advanced Full Dimensional Operations

## Enabling Capabilities and Considerations

- **Joint Interdependence**
  - Joint Expeditionary Forces
- **Strategic and Theater Lift**
- **Middle Weight Forces**
  - Army Strike Forces (Near to Mid Term)
  - Army Battle Forces (Far Term)
  - USMC Forces
- **3-D Maneuver and Vertical Envelopment**
- **Future Urban/Complex Terrain Warfare**
- **Regional Engagement**



# Advanced Full Dimensional Operations Response Mid Term Additive Capabilities

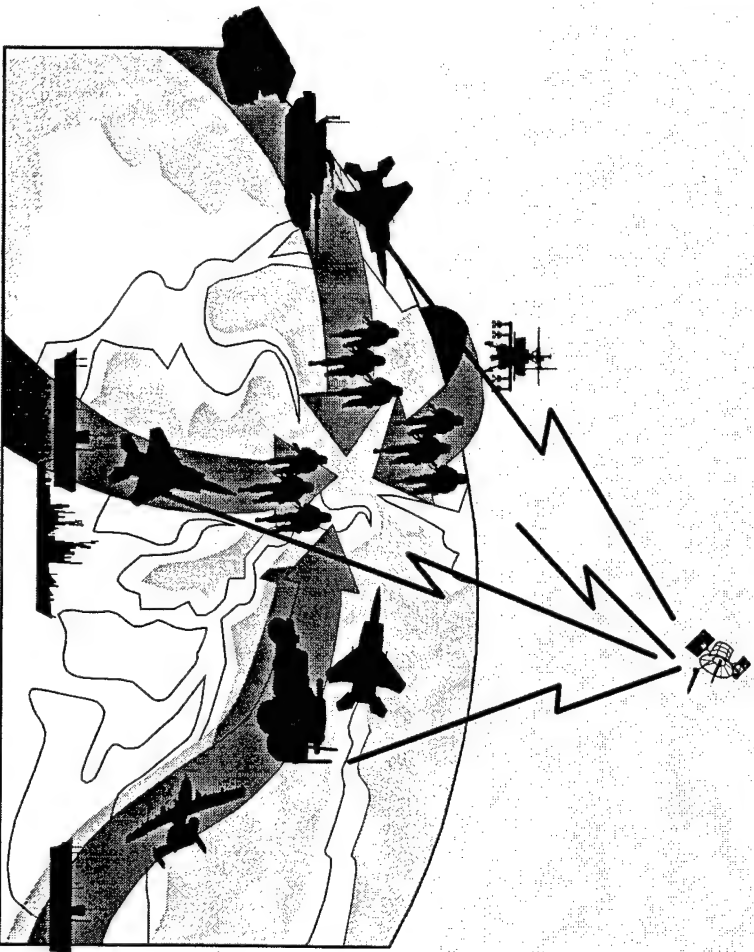


Simultaneous Response . . . Full Synergy & Dominance  
of Joint Capabilities may be Realized from the Beginning



# Strategic Maneuver & Interdiction

## *Joint Expeditionary Forces Circa 2025*



**Wrest the Operational Initiative  
Achieve Dominance, terminate the  
Conflict or Set the Conditions for Rapid  
success of Follow On Forces**

- Power projection from all points of the Globe converge simultaneously . . .
- To any point on with overwhelming land, air, space, and sea forces paralyze enemy
- Overseas presence quickens global maneuver & interdiction
- Being “First with the Most” reduces risk and begins process of psychological domination

Controls centers of gravity,  
Forces enemy to come to us  
and either fight and lose,  
or abstain and concede.

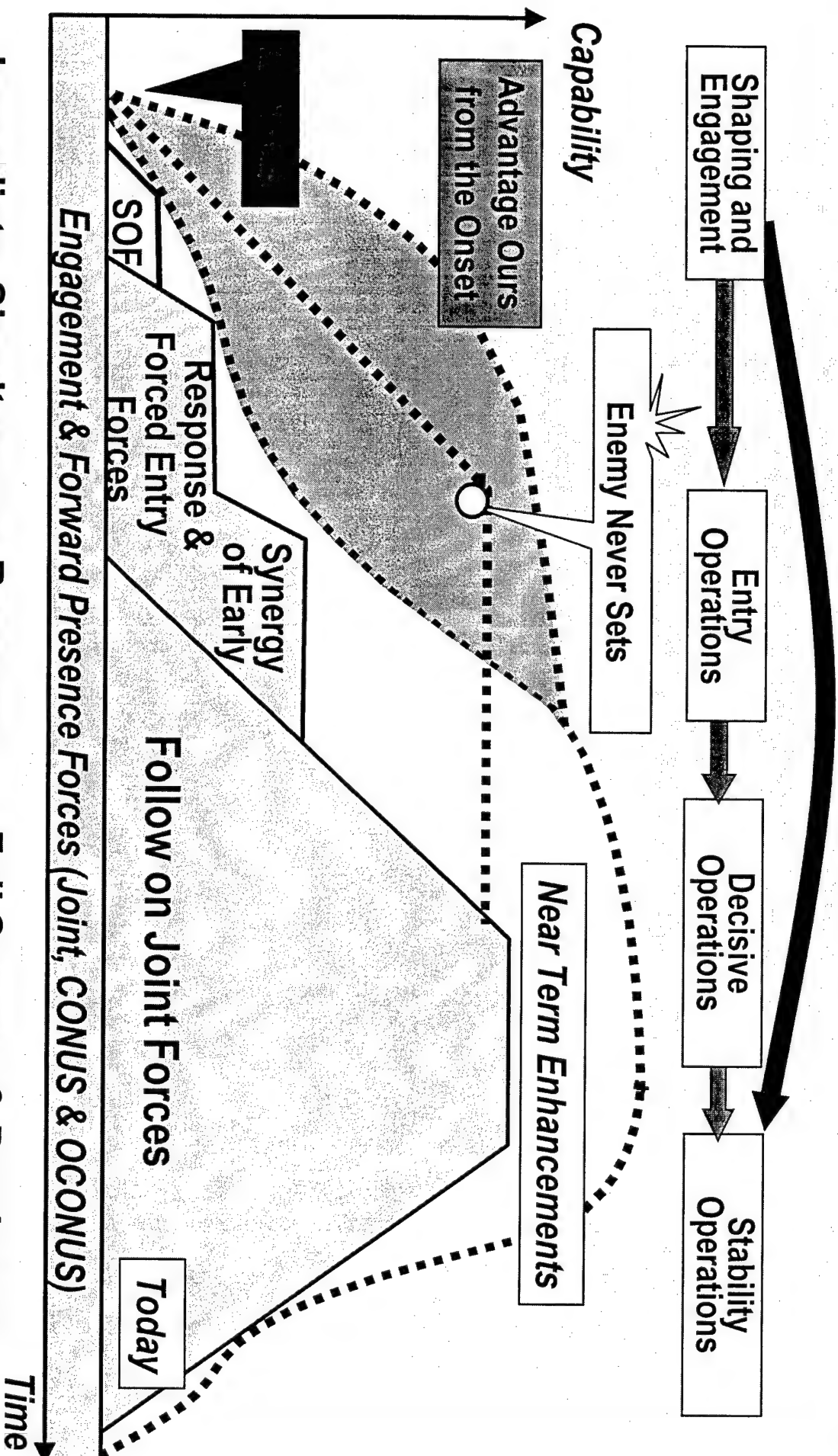
**Joint Expeditionary Forces: Globally deployable forces capable of immediate  
Dominance of All Military Dimensions and Striking directly at strategic and  
operational centers of gravity . . . Sum of actions achieves Strategic Ends**





# Advanced Full Dimensional Operations

## Circa 2025



Immediate, Simultaneous Response . . . Full Synergy & Dominance  
Of Joint Capabilities Immediately Realized Across All Dimensions





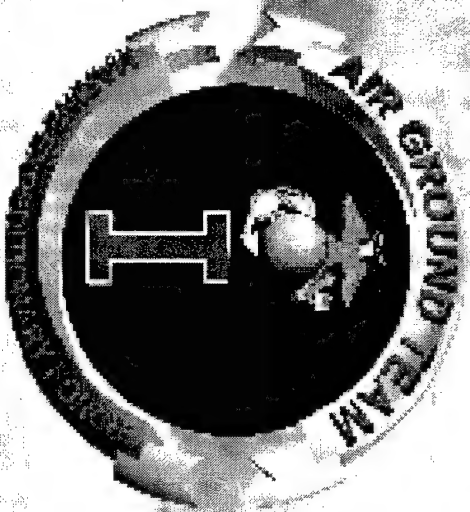
# Summary

- Strategic Preclusion thru Advanced Full Dimensional Operations
  - Immediate, simultaneous application of Joint interdiction and maneuver
  - Rapidly Dominates all military dimensions
  - Enemy concedes or is set up for failure in the face of follow on forces
  - An end to end concept, operationalized in the near to mid term and fully realized with AAN and other service future capabilities

"Interdiction and Maneuver . . . complementary operations designed to achieve the JFC's campaign objectives. . . Potential responses to . . . synchronized maneuver and interdiction can create an agonizing dilemma for . . .

P-3-30

# KERNEL BLITZ '97



## INFORMATION BRIEF

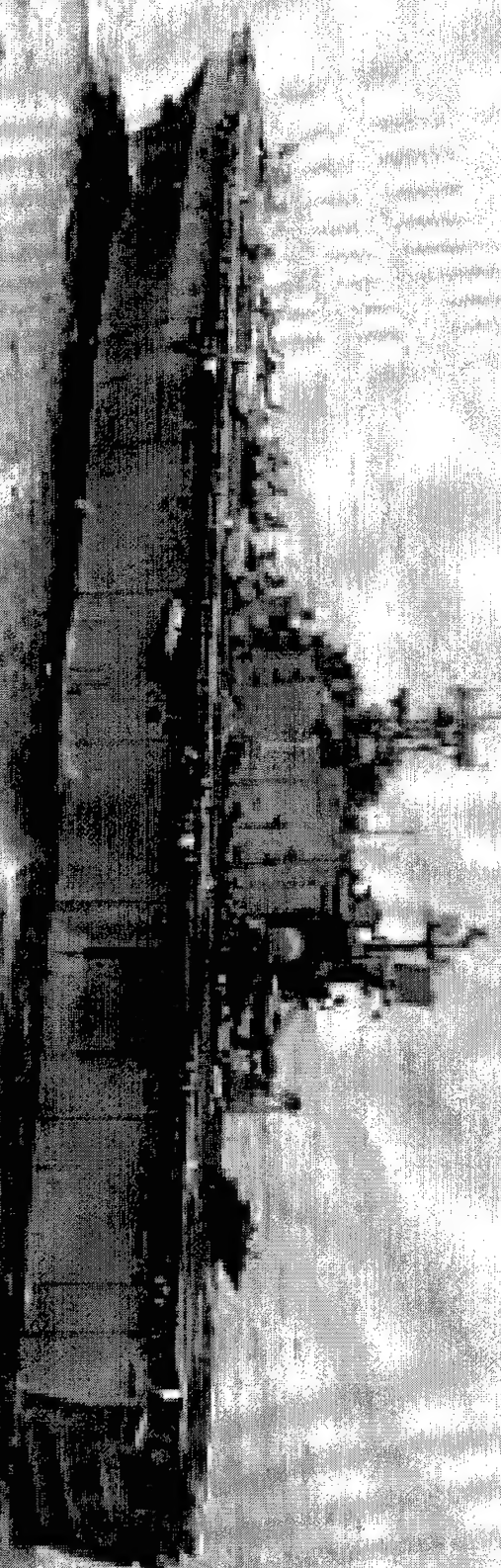
## KB 97 UNDERLYING CONCEPTS AND DESIGN PREMISES

- DOCTRINAL BASIS FOR ALL PLANNED ACTIONS
- REPLICATE AN ESTABLISHED OPLAN IN EXECUTION
- FORCE PROTECTION/OPERATIONAL RISK MANAGEMENT
- FOCUS ON AMPHIBIOUS OPERATIONS
- ACCOMPLISH EMBEDDED EXERCISE AND MSE OBJECTIVES
- INCORPORATE EMERGING TECHNOLOGY



## NAVAL FORCES

“WHEN DIRECTED, DESIGNATED MARITIME FORCES EXECUTE LIMITED OBJECTIVE, SHORT DURATION AMPHIBIOUS AND SPECIAL OPERATIONS WITHIN THE STRAIT OF CATALINA AND ALONG THE LITTORAL OF DIEGO IN ORDER TO RE-ESTABLISH FREEDOM OF NAVIGATION”







C2PG

CNN

CPG 3 LOG  
BOOK

**JMC'S SHIPS  
TRACKS**

## REAR PROJECTION SCREENS

# PC-BRIEFS, WEB ETC

# TCO

## WORK AREA

# COPYER

# PRINTER

SHIPS PHONE

# DSN, COMMERCIAL

# LARGE MONITOR

# SIPRNET LAPTOP

# PROJECTORS & COMPUTERS

G2

99

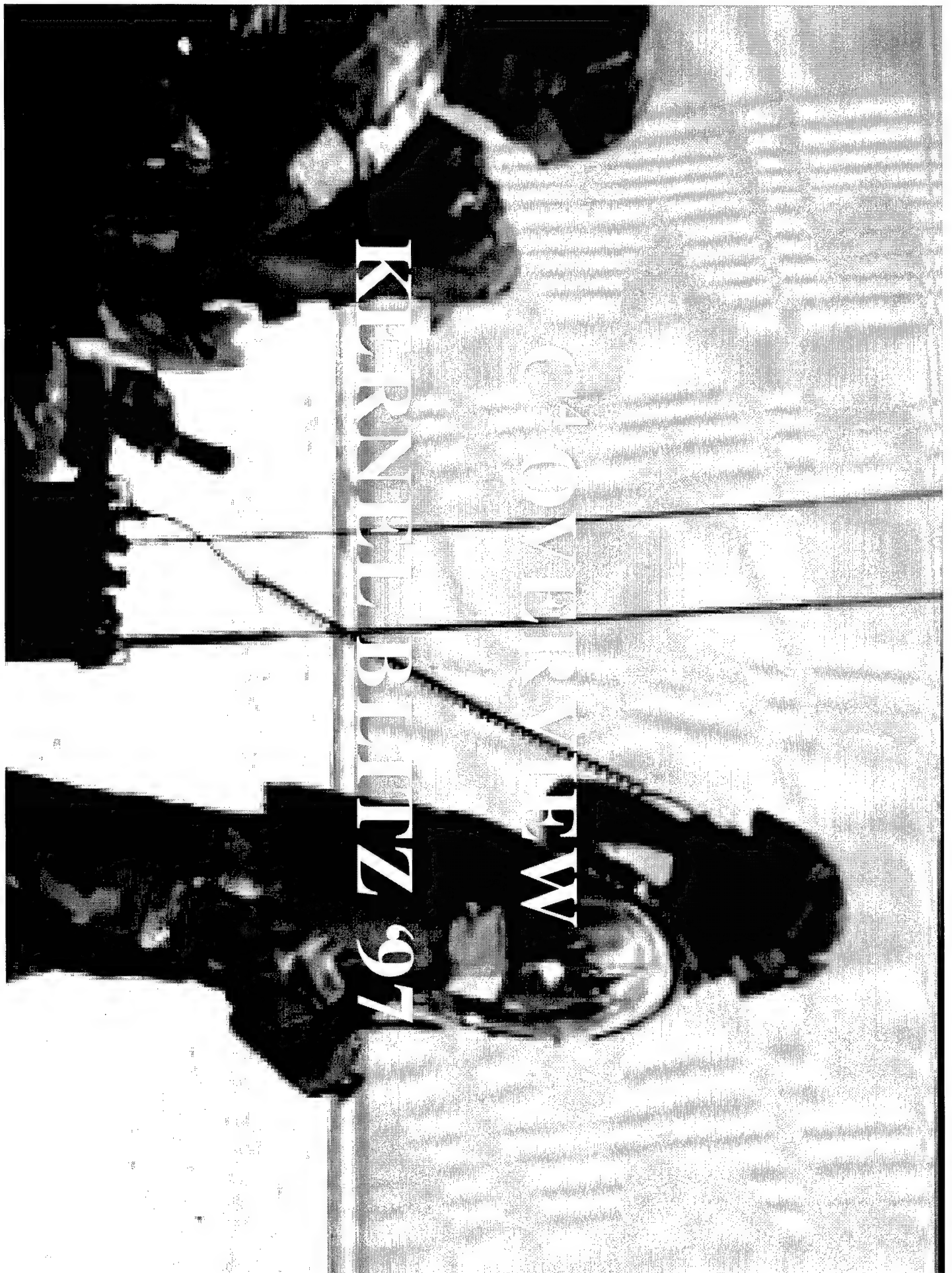
G2

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AIR

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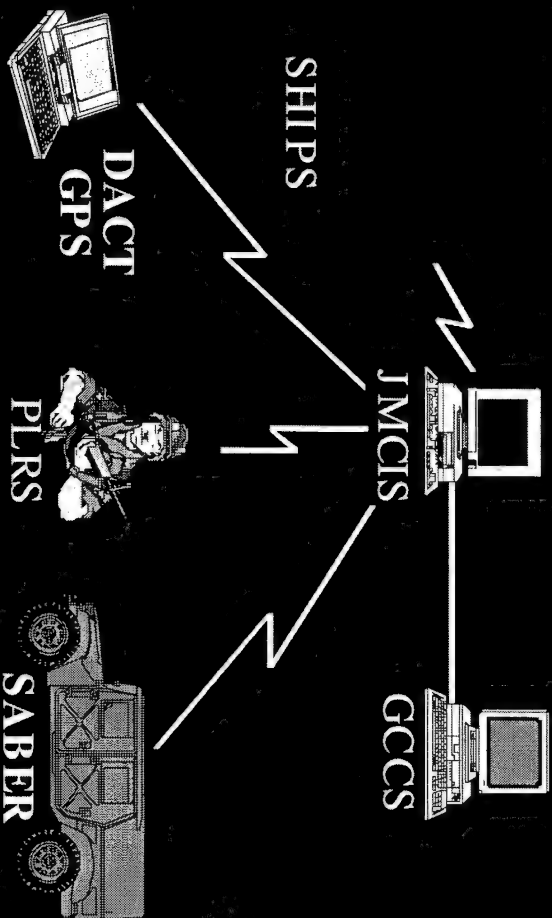


# COVER VIEW KIRKBLITZ '97

# KB '97 TECHNICAL ENHANCEMENTS / TECHNOLOGY INCORPORATION

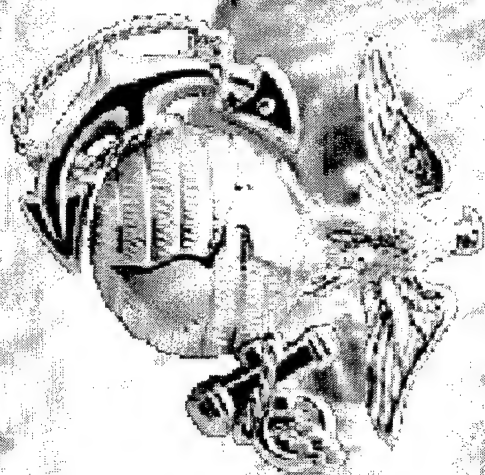


## COMMON TACTICAL PICTURE



## ELECTRONIC UPDATE OF GROUND TRACK PII

FORWARD...FROM THE SEA...



# National Fleet, USCG Expeditionary Warfare, and Project Deepwater

Rear Admiral James D. Hull, USCG

Director, Operations Policy Directorate (G-OP)

Coast Guard Headquarters

National Defense Industrial Association Expeditionary Warfare Conference

Panama City, Florida

2-5 November 1998

## National Fleet: A Shared Commitment to Meet 21st Century Operational Requirements

“The real revolution will be in *thinking*, not things... A revolution of shared purpose, operational integration, and common effort.”

Admiral Jay Johnson

Chief of Naval Operations, 1997

“We need to think about coordinating and integrating our force planning activities so that we can field non-redundant capabilities that are affordable, joint, interoperable, and multi-mission.”

Vice Admiral James Loy

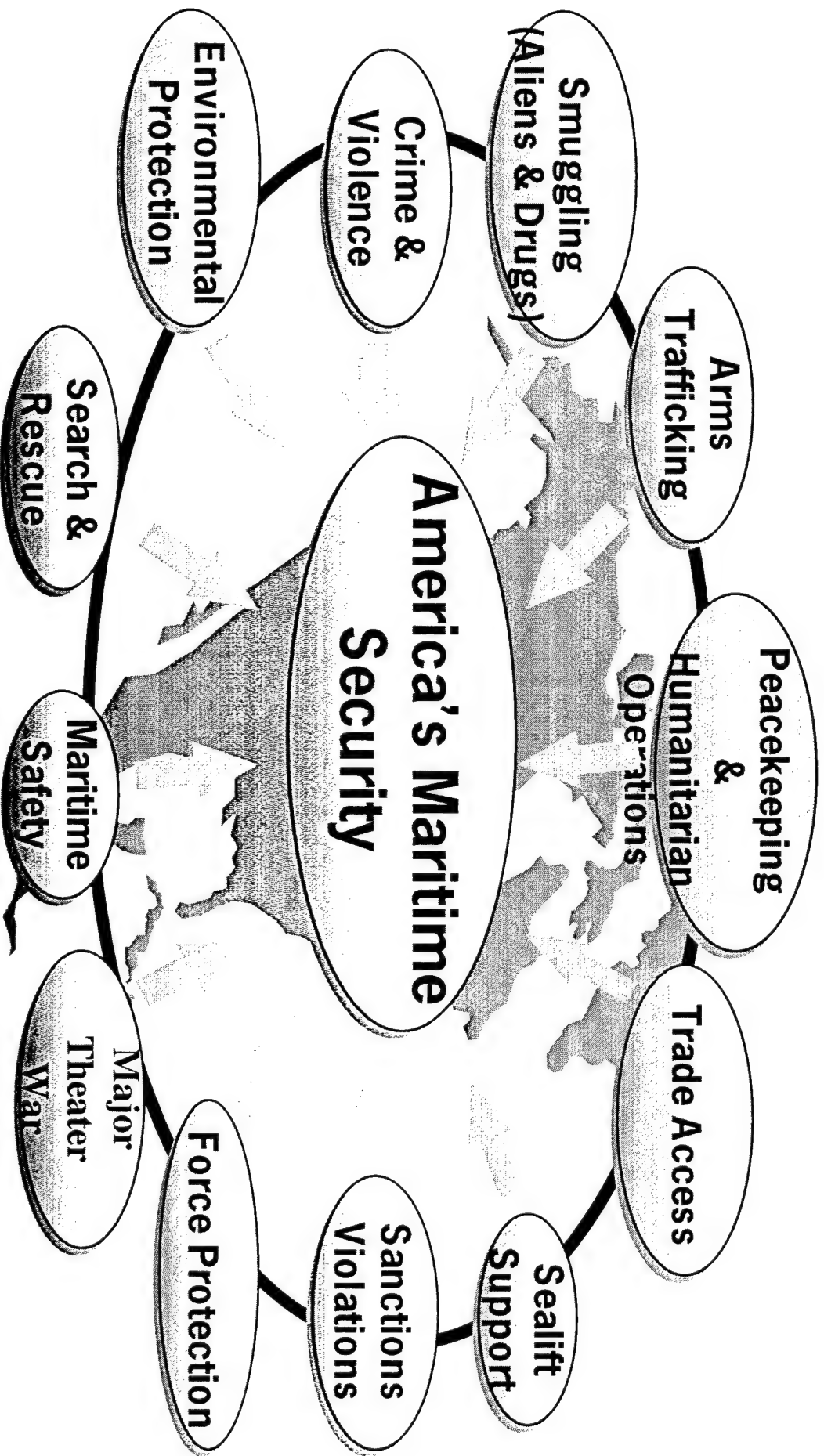
Chief of Staff, U.S. Coast Guard, 1997

# National Fleet: The Concept

- USN and USCG Shared Purpose and Common Effort
- Combined Force Needed to Establish Numerical Sufficiency Required for Effective Global Operations
- Coordinated and Integrated Planning and Operations

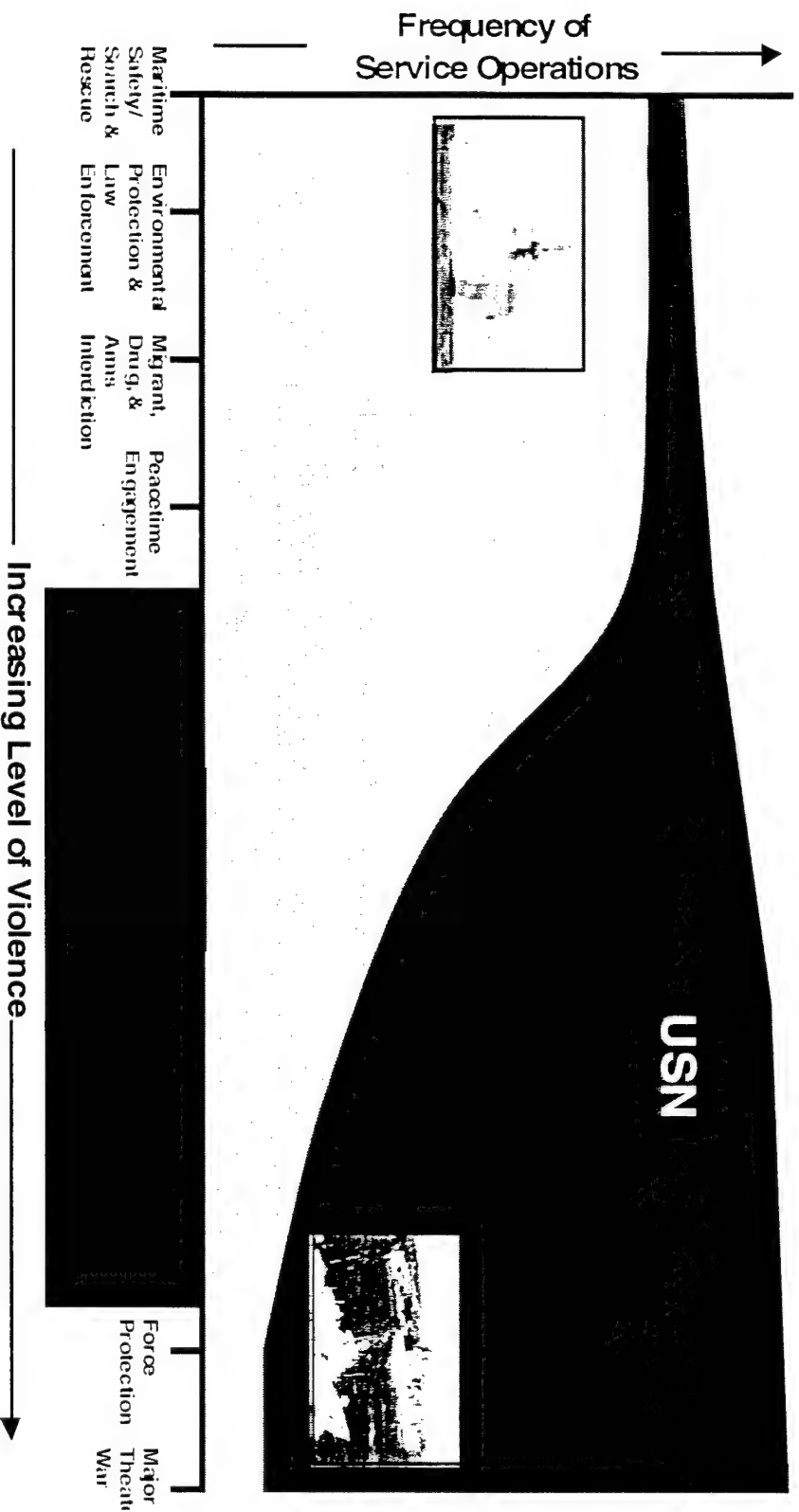


# America's Maritime Challenges



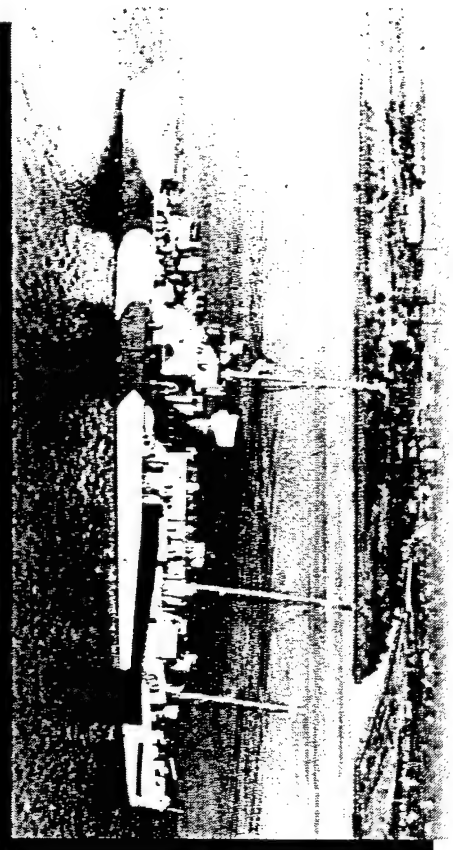
# National Fleet: Shaped for Joint & Combined Operations

Spectrum of Coast Guard - Navy Missions



# National Fleet: Two Centuries of Successful Cooperation at Sea

- “Joint” Operations in Every Major War Since 1790
- USCG Complements USN Forward Presence and Crisis Response:
  - Specialized skills
  - Acceptance



# Joint Operations and Challenges

- 1995 DoT-DoD MoA Outlining USCG National Defense Missions:
  - Maritime Intercept Operations
  - Deployed Port Operations, Security and Defense
  - Environmental Response Operations
  - Peacetime Military Engagement
- Critical Shortcomings Impacting Cooperation:
  - Incompatible Equipment
  - Complex Logistics Support
  - Aging/Substandard USCG Platforms and Systems

# National Fleet: Key Attributes

- Multi-mission Surface Combatants and Maritime Security Cutters:
  - Navy: Highly Capable Warships for the Full Spectrum of Naval Operations from Peacetime Engagement to Major Theater War
  - Coast Guard: Major Cutters for USCG Roles and Missions, plus Peacetime Engagement through MTW
- Designed Around Common Equipment and Systems
- Synchronized Planning, Procurement, Operations, and Training to Meet the Entire Spectrum of 21st Century Operational Requirements

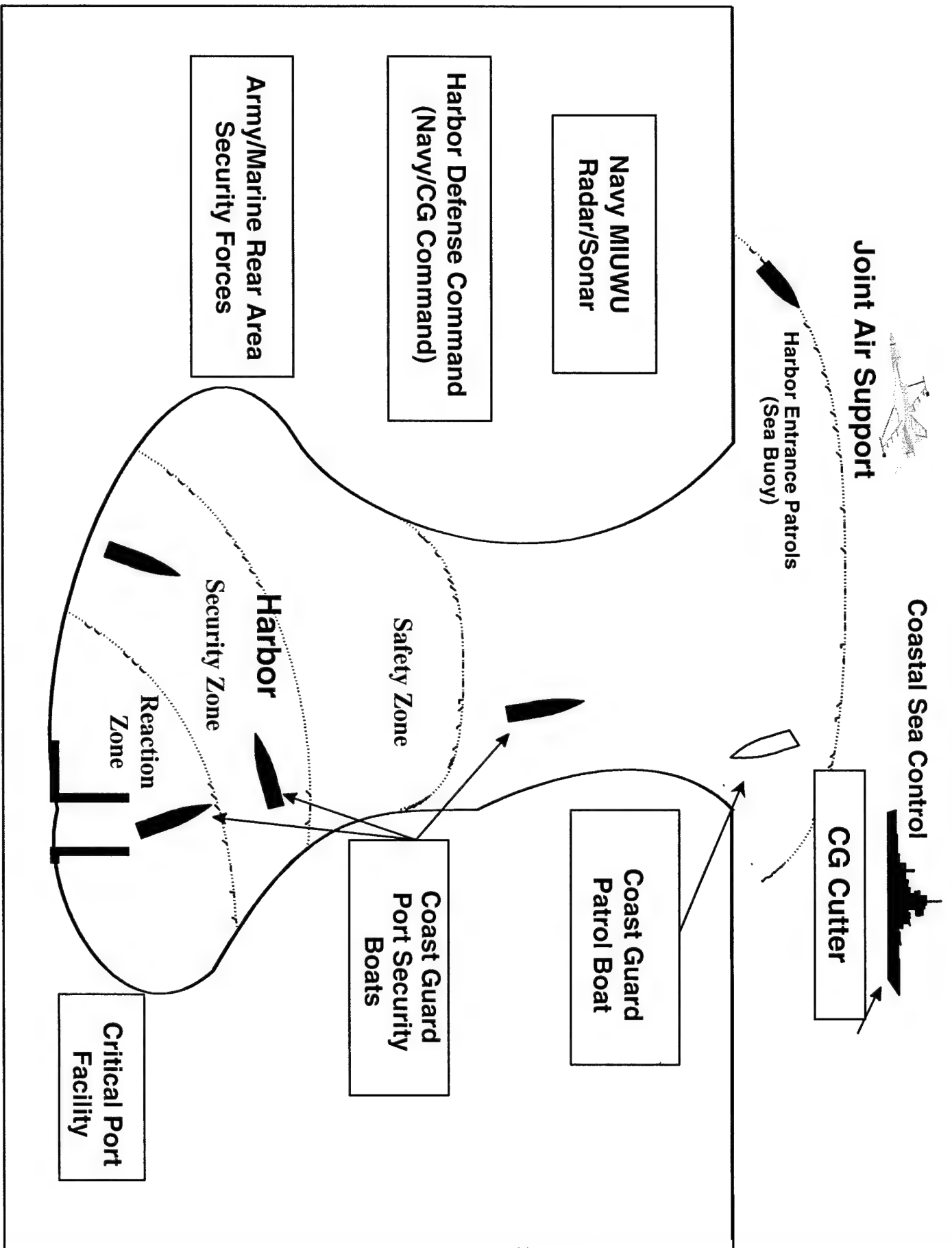
# Coast Guard Expeditionary Forces: Support To CinCs

- 378' WHEC With Embarked Aircraft
- 110' WPB Squadrons
- Visit, Board, Search & Seizure Teams
- Navy Harbor Defense Command Units
- Port Security Units
- Mobile Support Units
- 370 Cutter Days Forward Deployed  
Annually



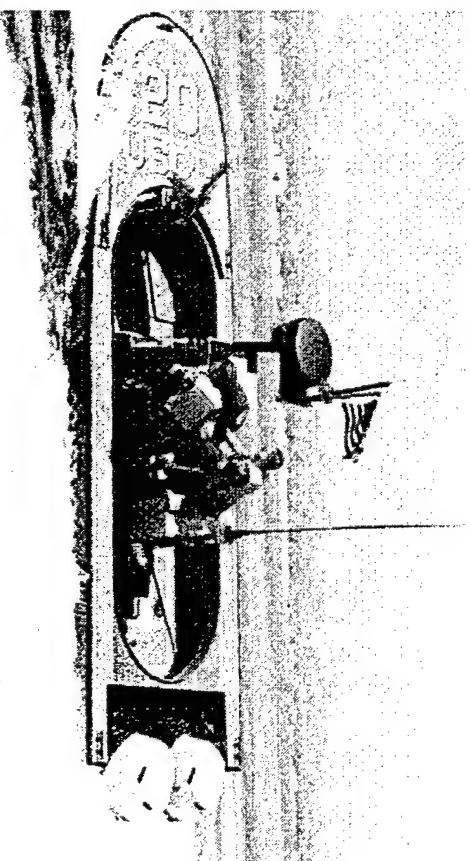
# Deployed Port Operations, Security and Defense

- Ensure port and harbor areas are maintained free of threats to support Strategic Mobility & Sustainment operations:
  - Hostile threats
  - Terrorist actions
  - Safety deficiencies
- Expeditionary capability for coastal sea control and harbor defense in foreign areas



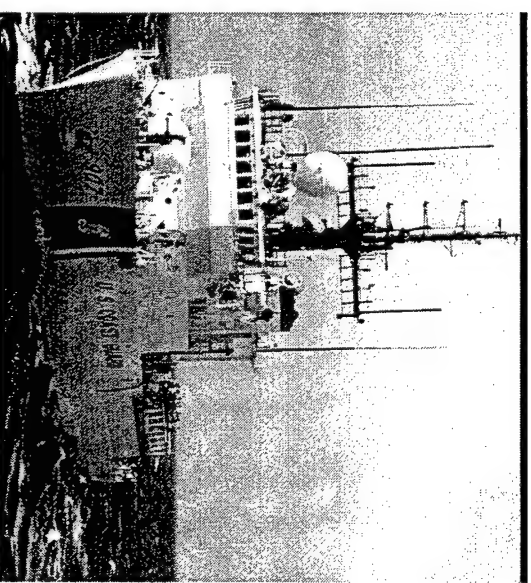
# Port Security Unit

- CinCs OPLANs/TPFDD
- Antiterrorist force protection
- Seaports of embarkation/debarkation
- 6 armed smallboats/117 personnel
- Radar, night vision  
secure comms
- PSRC needed for  
full deployment

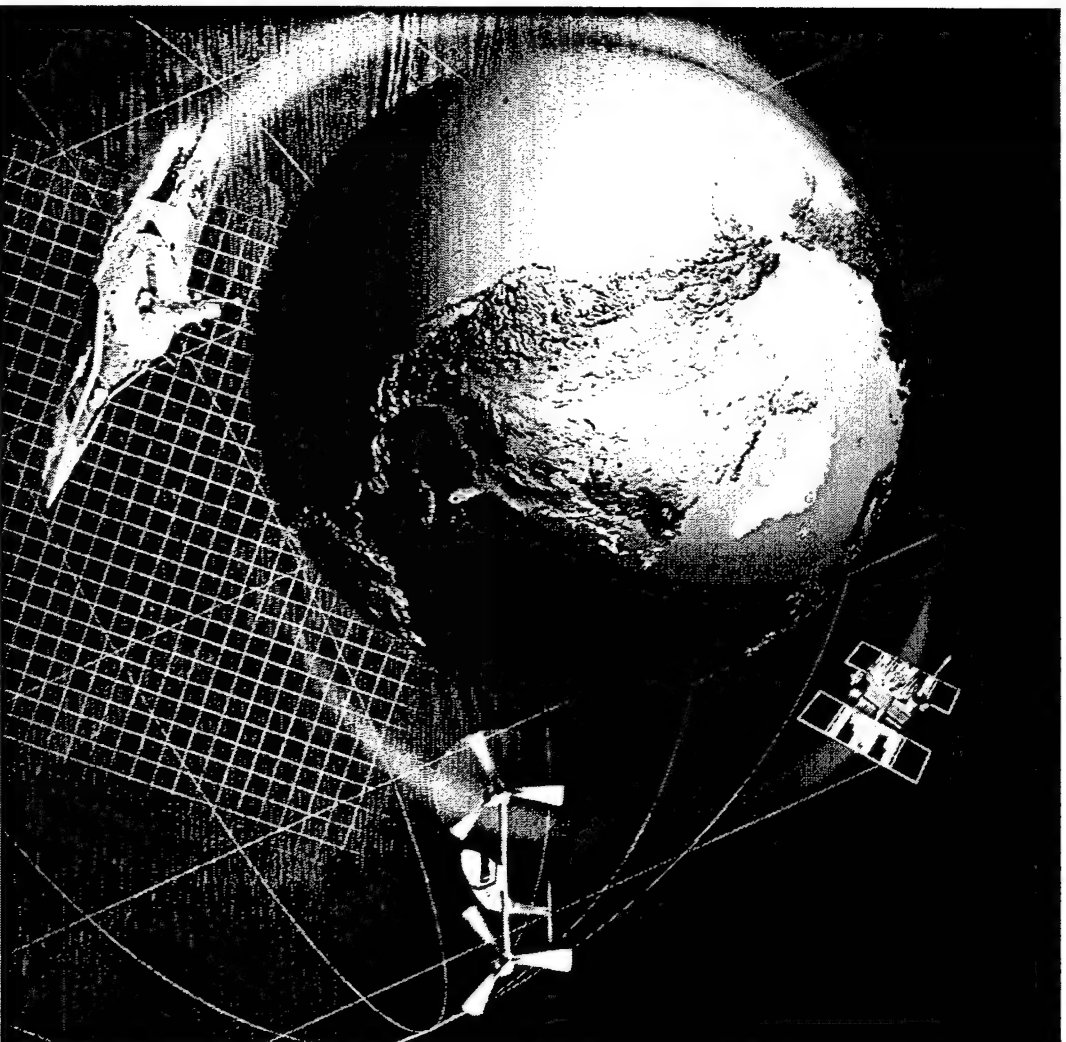


# Peacetime Military Engagement

- Coast Guard interacts with many host nation agencies
- Good mission match with host nation forces
- Coast Guard presence desired



# **The USCG Part of National Fleet: An Integrated Deepwater System**



# **What is Deepwater ?**

**Deepwater Is: A Mission**

**A Project**

**And Most Importantly...**

263

**We must ‘...Be Aggressive and Bold... The Deepwater Project... It is our Future’**

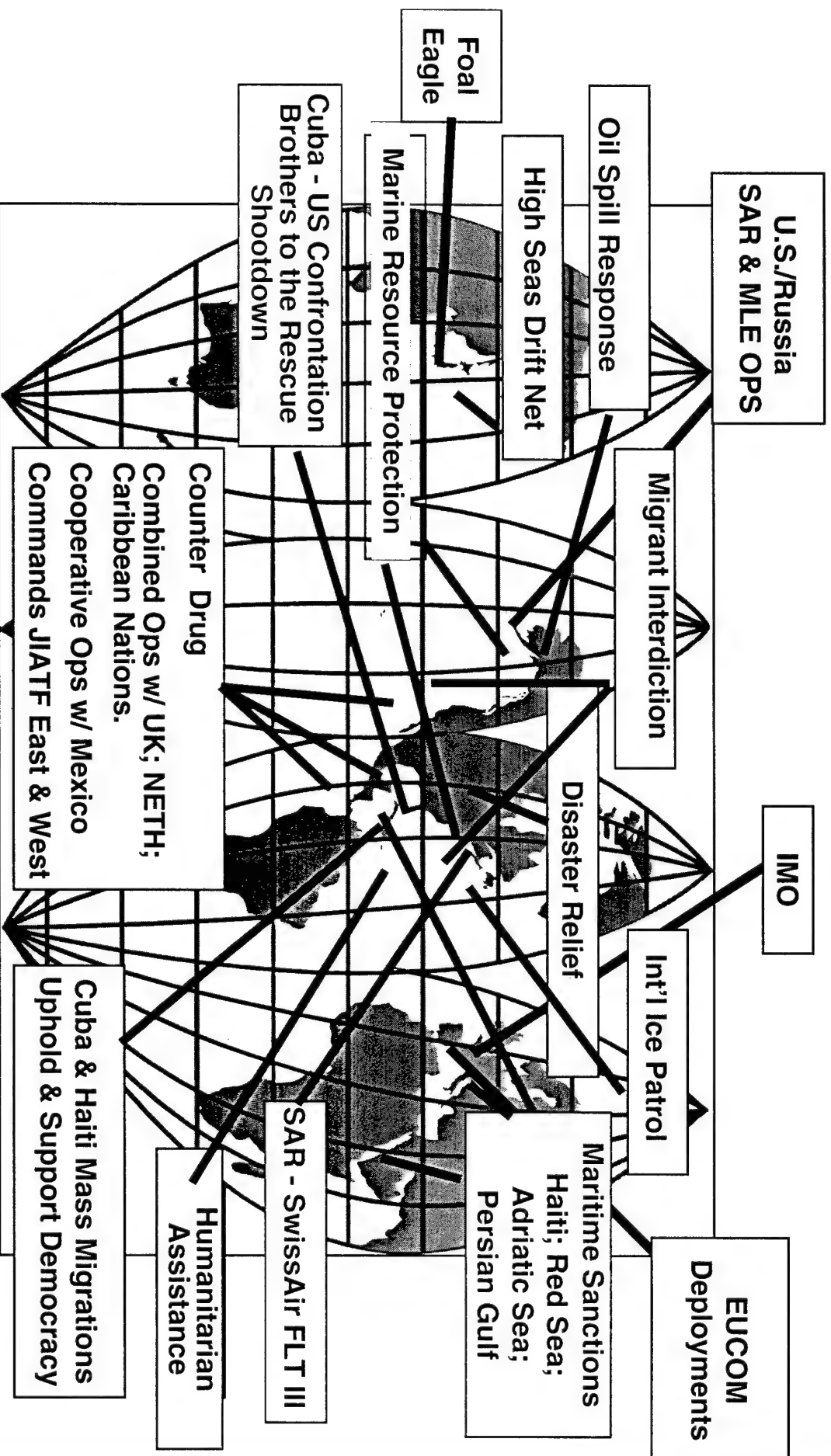
*Admiral James Loy*

*Commandant*

*U.S. Coast Guard*



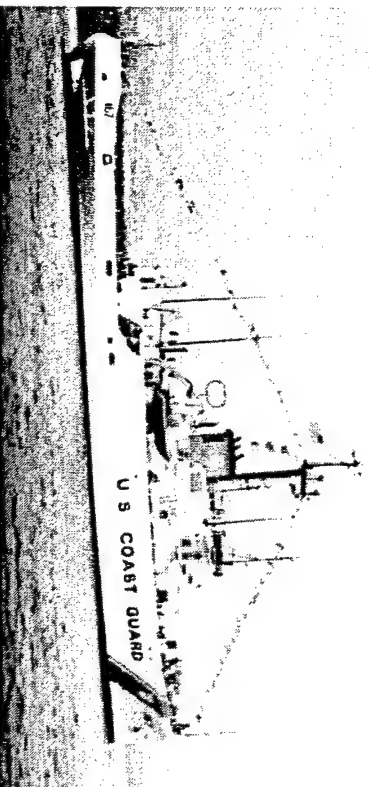
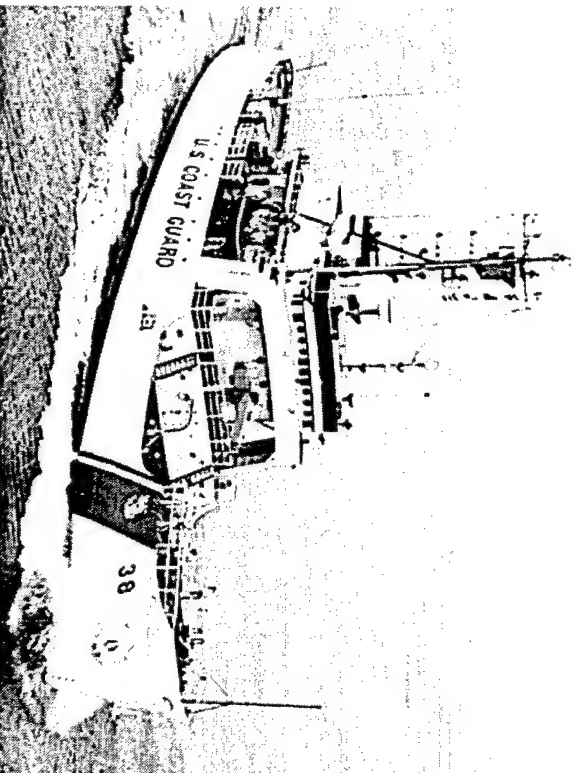
# USCG Deepwater Operations



# Problem: Aging Deepwater Assets

## “Technologically Challenged”

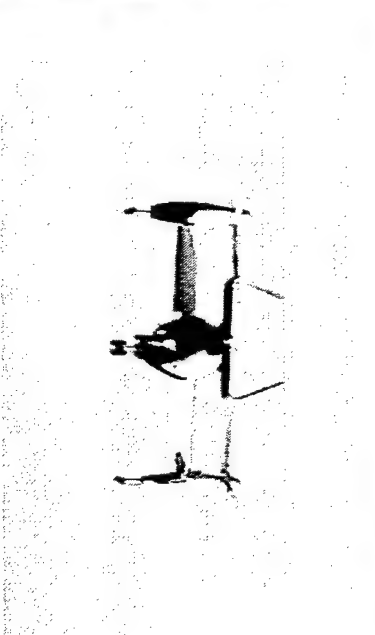
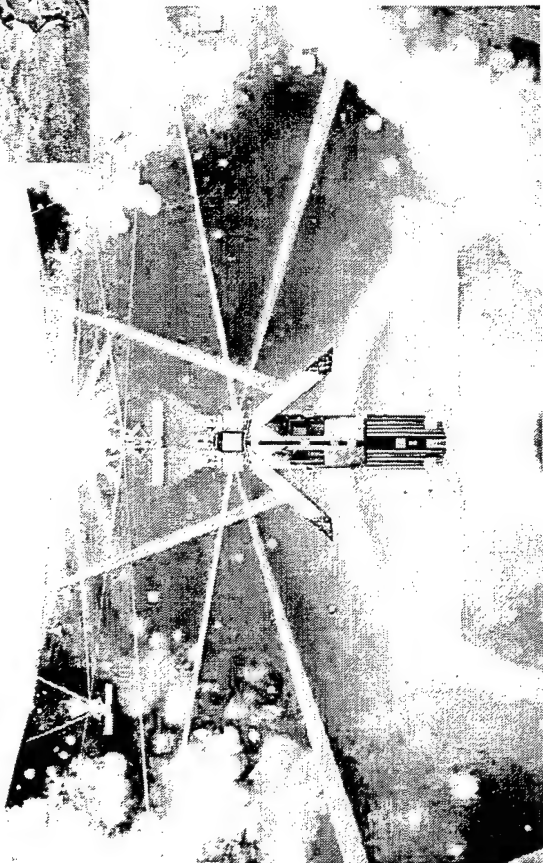
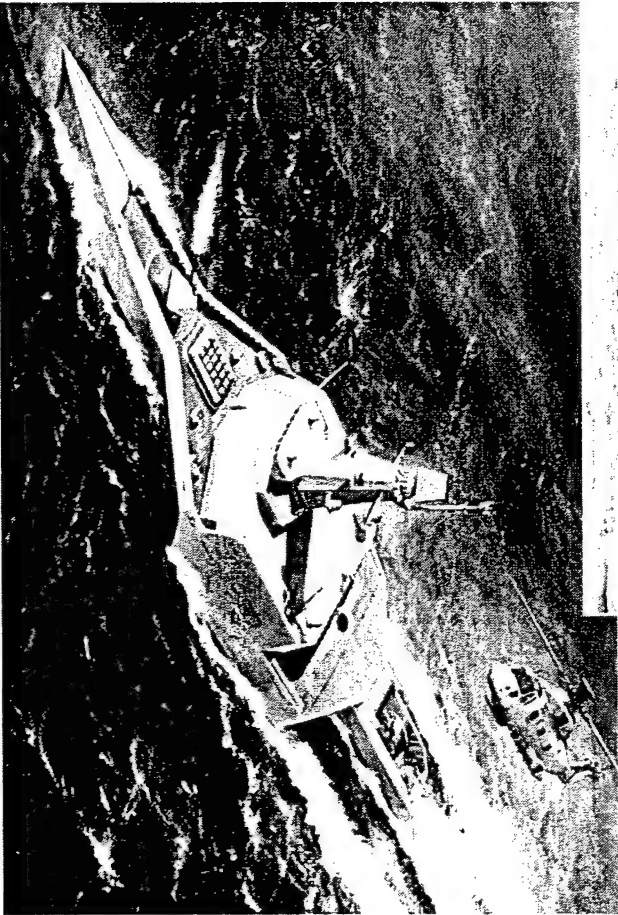
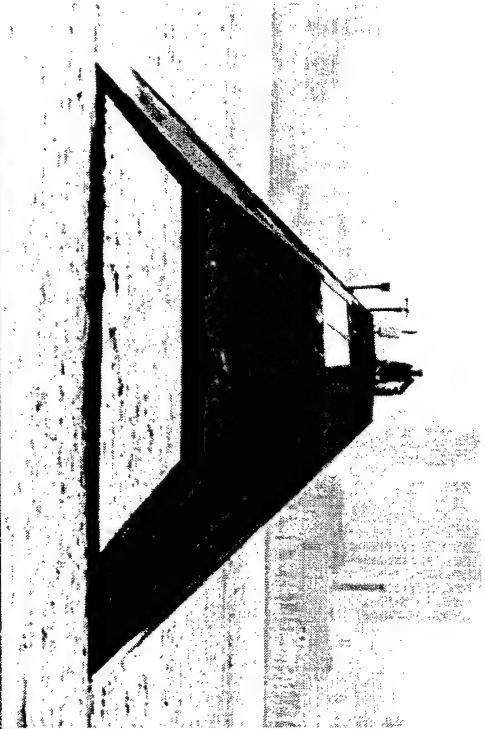
The average age of our Deepwater cutters is 25... The Coast Guard fleet of High and Medium Endurance Cutters is older than 39 of the 41 (naval) fleets worldwide...



# Deepwater Acquisition Project: Key Force Planning Factors

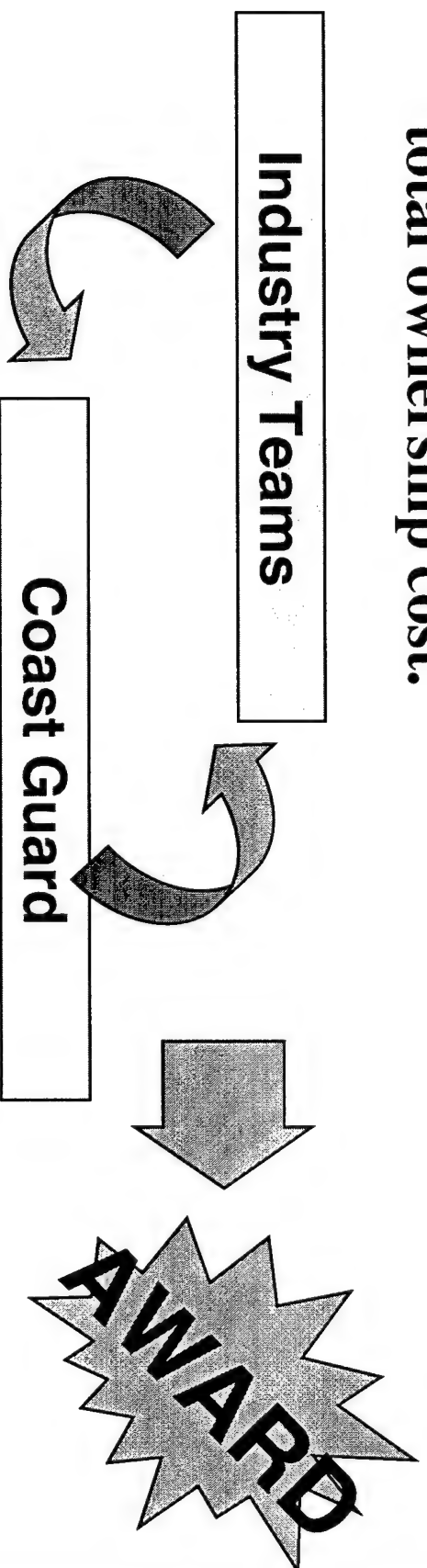
- Need for an *integrated* force structure analysis
- Emerging “Network-Centric” concept of operations
- Total ownership affordability
- Multi-mission & operational flexibility
- “Tailored” for multi-agency operations
- Expeditionary mind-set
- Shaped for joint & combined operations...
  - National Fleet
  - Common Aviation Vision
  - A World “System-of-Systems”

# Realm of the Possible - Unlimited



# Deepwater - Acquisition Strategy

- The Coast Guard is teaming with industry to provide the best Integrated Deepwater System at the lowest total ownership cost.



- The Coast Guard provides mission based scenarios to industry. Using the scenarios and an open, established framework of communication, industry will develop IDS concepts.

# Deepwater Industry Teams

## **Avondale Industries, Inc.**

Boeing-McDonnell Douglas  
Corporation

John J. McMullen & Associates, Inc.

DAL, Inc.

Raytheon Systems Company

## **Science Applications**

### **International Corporation**

Marinette Marine Corporation

Sikorsky Aircraft Corporation

Soza & Company, Ltd.

Bath Iron Works

CTM Automated Systems

AMSEC

Fuentez Systems Concepts, Inc.

Gibbs & Cox, Inc.

Interactive Television Corporation

## **Lockheed Martin Government**

### **Engineering Systems**

Litton Ingalls Shipbuilding

Litton PRC, M. Rosenblatt & Son,

Litton Sperry Marine, Inc., Litton

Data Systems

Bell Helicopter Textron

Lockheed Martin Information Systems

Lockheed Martin Ocean Radar and

Sensor Systems

Sanders, a Lockheed Martin Company

Lockheed Martin Aeronautical Systems

Lockheed Martin Federal Systems -

Owego

Lockheed Martin Management and Data

Systems

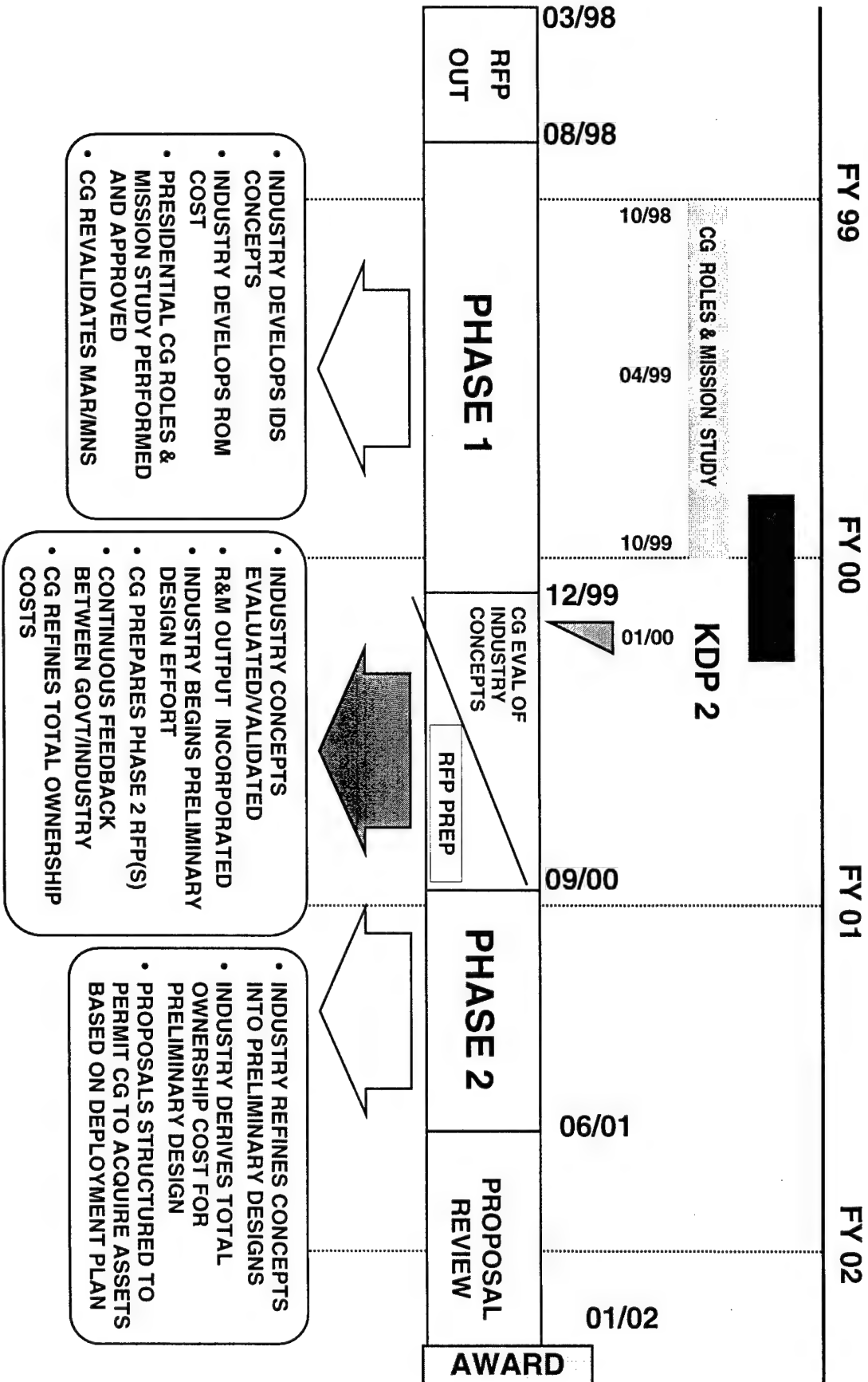
LOGICON

L3 Communications, Inc.

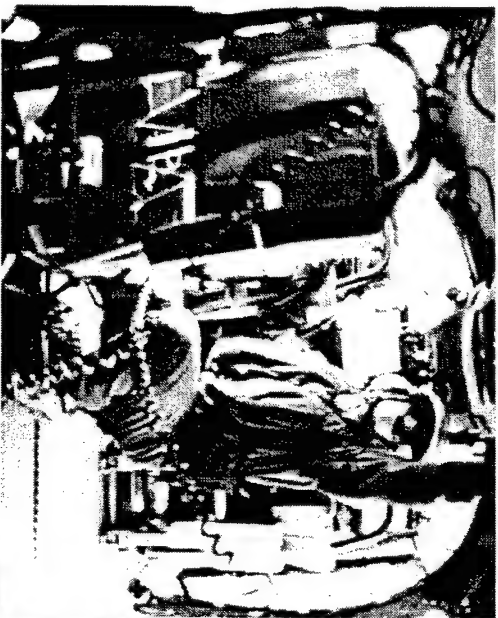
PROSOFT



# Deepwater Timeline



# National Defense Industrial Association Expeditionary Warfare Conference '98



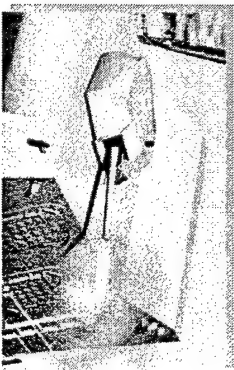
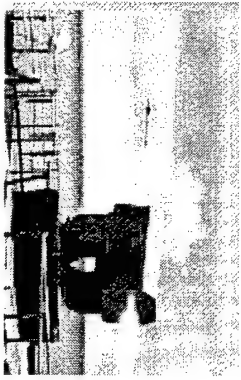
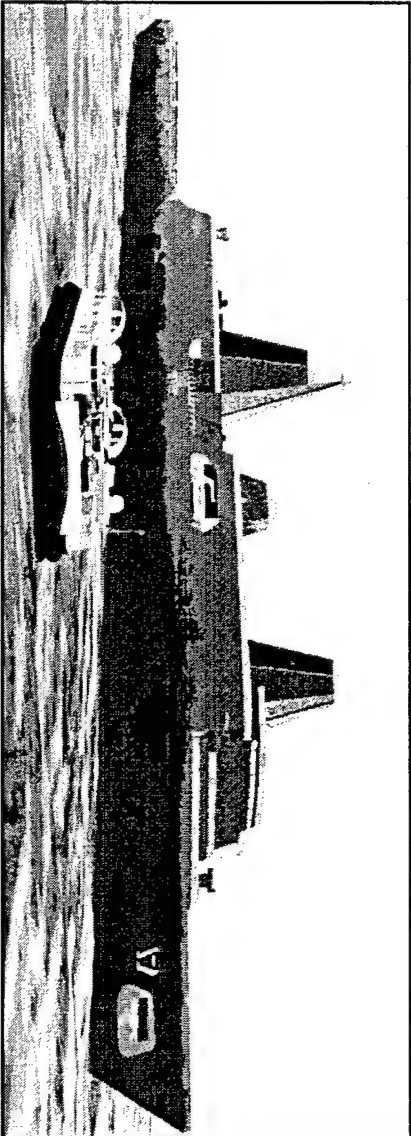
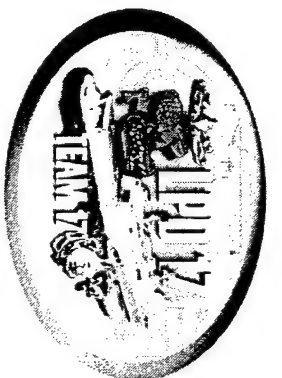
“Questions?”

# Naval Operational Capabilities for Coast Guard Cutters

- Good Speed and Long Endurance
- Kill Patrol Craft beyond Intermediate Caliber  
Gunfire Range
- Visual, Radar, Thermal Imaging & ESM
- Track Aircraft and EXchange Track Data
- IT-21 Type Communications
- Flight Deck and Support for SH-60R & Beyond
- Hard and Soft Kill against Cruise Missiles

# LPD 17

## *First Of Its Class*



**NDIA**  
**4 November 1998**



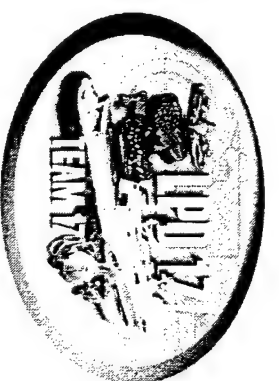


## ***Program Snapshot***

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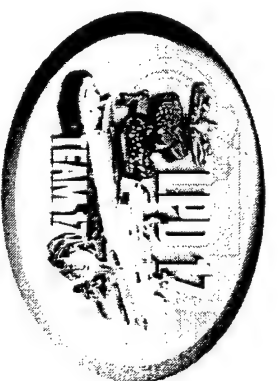
- ◆ • Acquisition Reform In Action

- ◆ • Innovative Products and Processes For Naval Shipbuilding

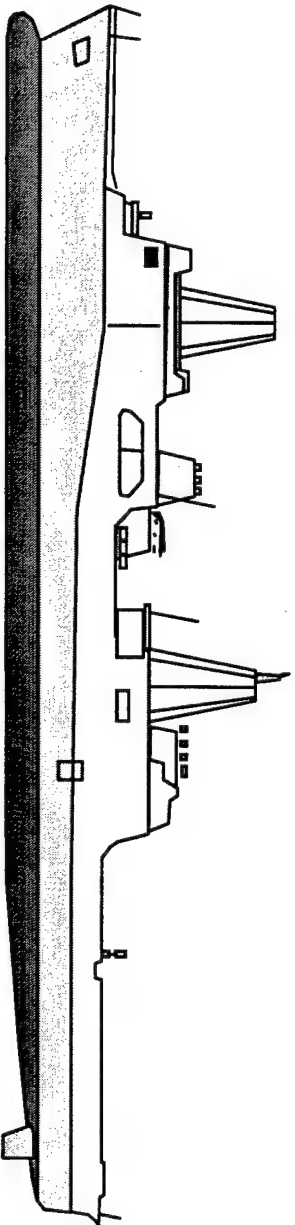
- ◆ • Leveraging Navy/Industry Teaming
  - Program Office co-located with Avondale Alliance

- ◆ • Making Excellent Progress

## ***Program Snapshot***



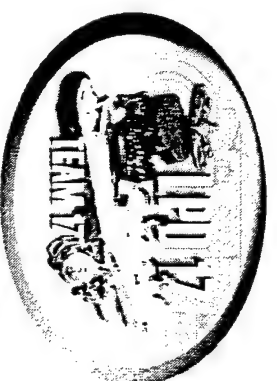
- ◆ • 12 Ships
- ◆ • Lead Ship Contract Awarded 12/96
- Two Follow Ship Options
- Lead Ship Delivers 11/02



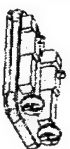
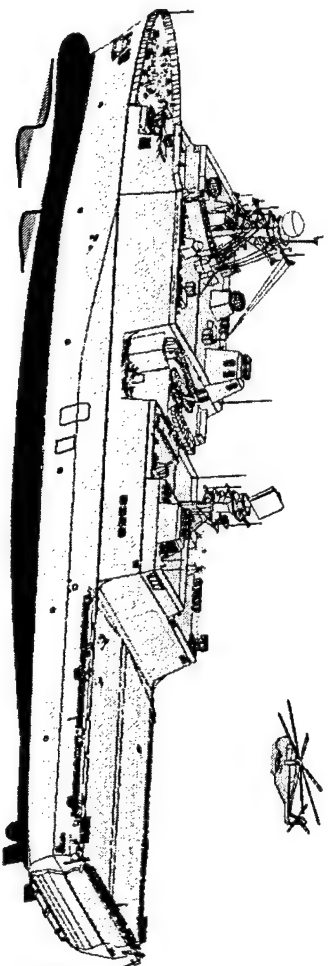
- ◆ • 12th Ship Delivers FY09
- ◆ • 40 Year Ship Service Life



# Requirements

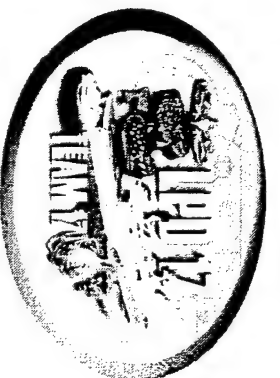


**Mission:** *To embark, transport, and land elements of a Landing Force in an assault by helicopters, landing craft, and amphibious vehicles.*



**12 Ships Required to Meet 2.5 MEB  
Fiscally Constrained Lift Goal**

# LPD 17 Will Replace

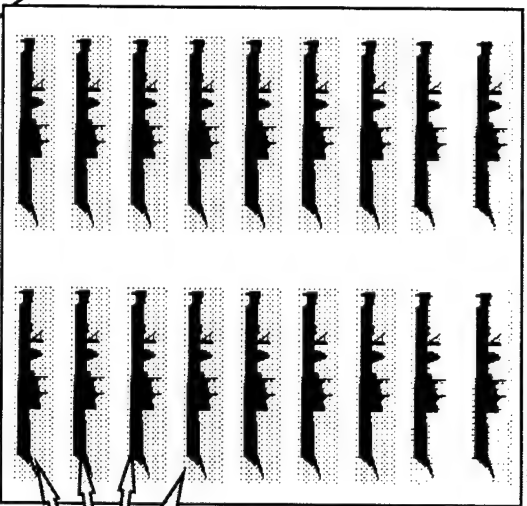


**LST 1179 CLASS**

AVG. AGE NOW: 23 YRS

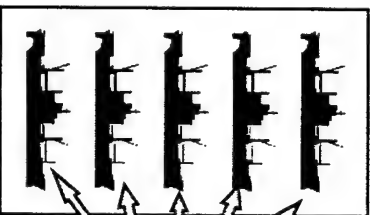
NRF PAC

NRF LANT



**LKA 113 CLASS**

RETIREMENT AGE: 25 YRS



180 DAY  
ROS

**LSD 36 CLASS**

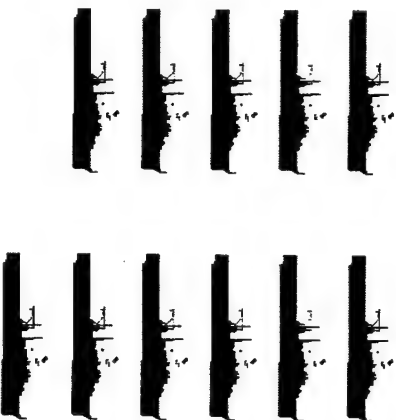
AVG. AGE NOW: 23 YRS



S  
C  
H  
E  
D  
U  
L  
E  
D  
E  
C  
O  
M

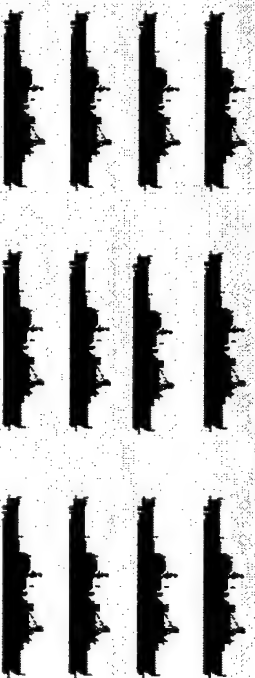
**LPD 4 CLASS**

AVG. AGE NOW: 26 YRS



180 DAY  
ROS  
TOTAL CREW: 13,000  
TOTAL TONNAGE: 525,000 LTONS

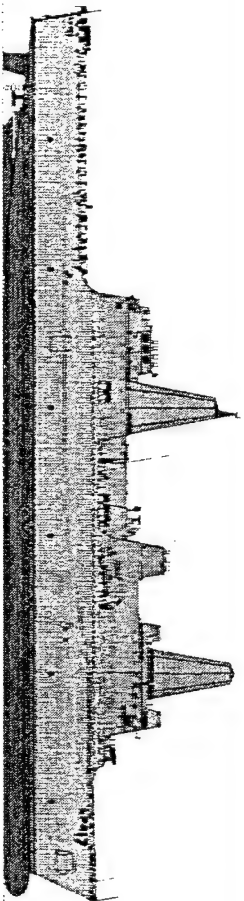
**LPD 17 CLASS**



- 12 ships functionally replacing 41 - approx 50% of amphibious lift

TOTAL CREW: 4,344  
TOTAL TONNAGE: 300,000 LTONS

# LPD 17 is...



## GENERAL CHARACTERISTICS

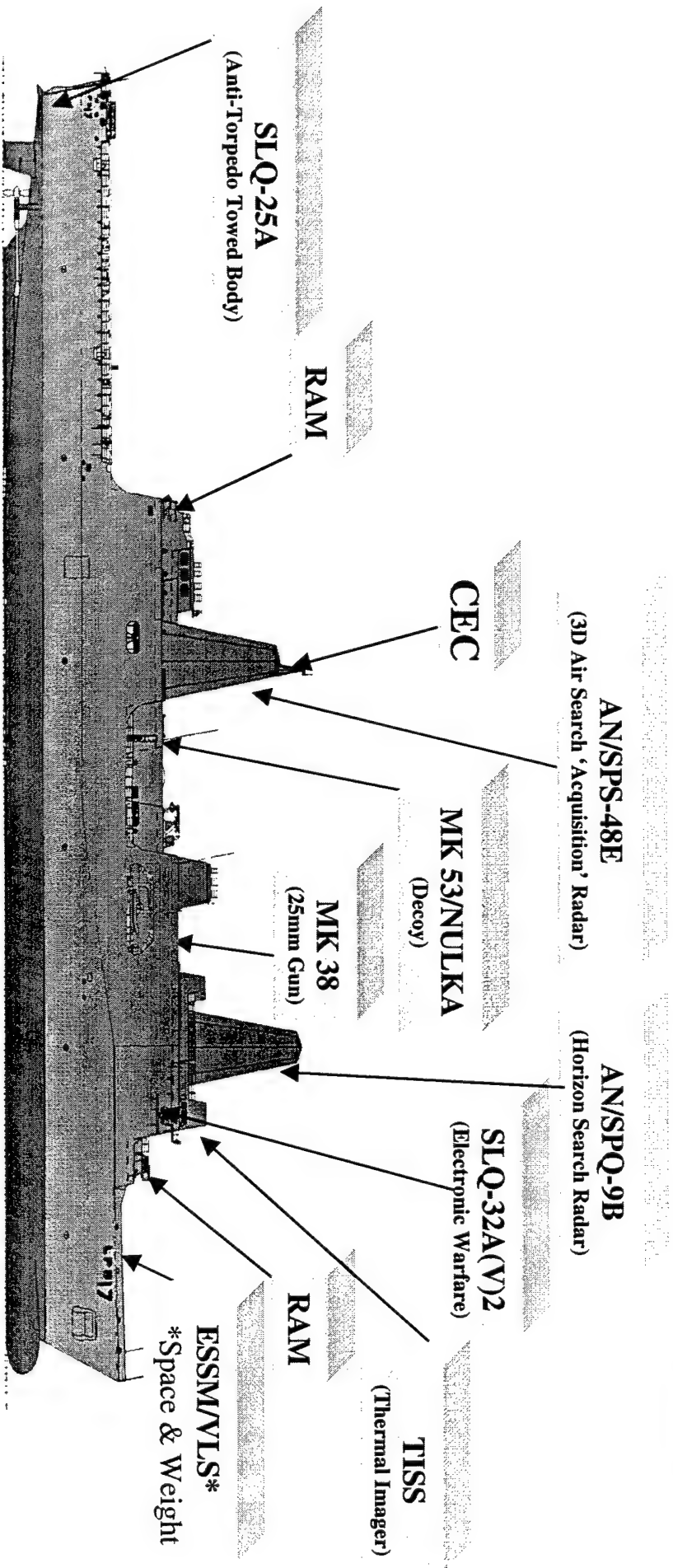
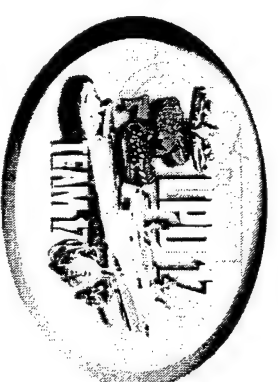
**LENGTH (LOA)** 208.4 M (684 FT)  
**BEAM (MAX)** 31.9 M (105 FT)  
**DRAFT** 7.0 M (23.0 FT)  
**DISPLACEMENT (FLD)** 25.3K MT (24.9K LT)  
**PROPULSION** 4 MED SPEED DIESEL  
**SHAFT POWER** 40K HP  
**SUSTAINED SPEED** 22+ knots

## MISSION CHARACTERISTICS

**VEHICLE AREA** 2.32K M<sup>2</sup> (25K FT<sup>2</sup>)  
**CARGO VOLUME** 1007 M<sup>3</sup> (36K FT<sup>3</sup>)  
**TROOPS** 720  
**LCAC** 2  
**AVIATION-LAND** 4-CH46, 2-CH53E or 2 MV22  
**HANGAR** 2-CH46, 1-CH53 or 1-MV 22  
**MEDICAL** CRTS with augment  
 (24 BED Ward/ICU & 2 Ors)

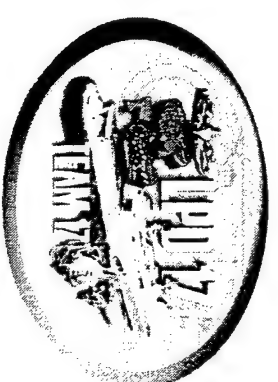
Schedule FY	97	99	00	01	02	03	04	05	06	07	08	09	Total
Award	1	1	2	2	2	2	2						12
Delivery						2	1	2	2	2	2	1	12

# Combat Systems and Survivability



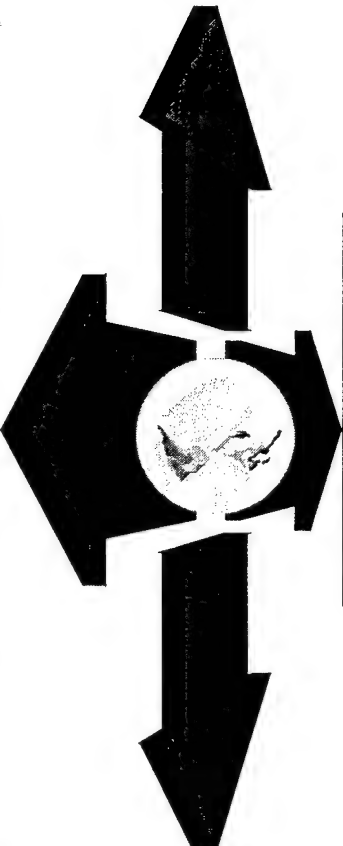
- Low Radar Cross Section
- Collective Protection System (4 Zones)
  - CBR (Chemical, Biological, Radiological) survivability
- Anti-Whipping Structure
  - Mine/Torpedo survivability
- Blast Hardened Bulkheads
- Shock Hardening

# “The Team in Place”



*Avondale Industries*

*Bath Iron Works*



*Raytheon*

*Intergraph Corporation*

## *Navy Program Management*

- Team 17 located at Avondale
- War Room at Little Creek





# **The Avondale Alliance**

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## **Avondale Industries, Inc.**

- Prime Contractor/FSC
- Hull and Below Deck Design
- Builds 8 ships

## **Intergraph Corporation**

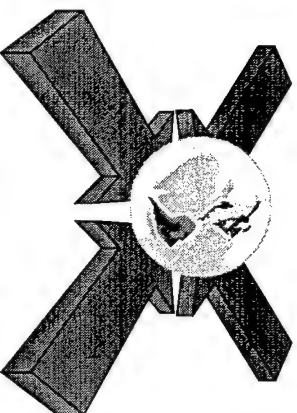
- IPDE Infrastructure/Software
- IPDE Support and Developmental Configuration

## **Bath Iron Works**

- Topside Design/Integration
- Builds 4 ships

## **Raytheon**

- Total Ship System Integration
- SWAN Development
- GFE Integration



**The TEAM**



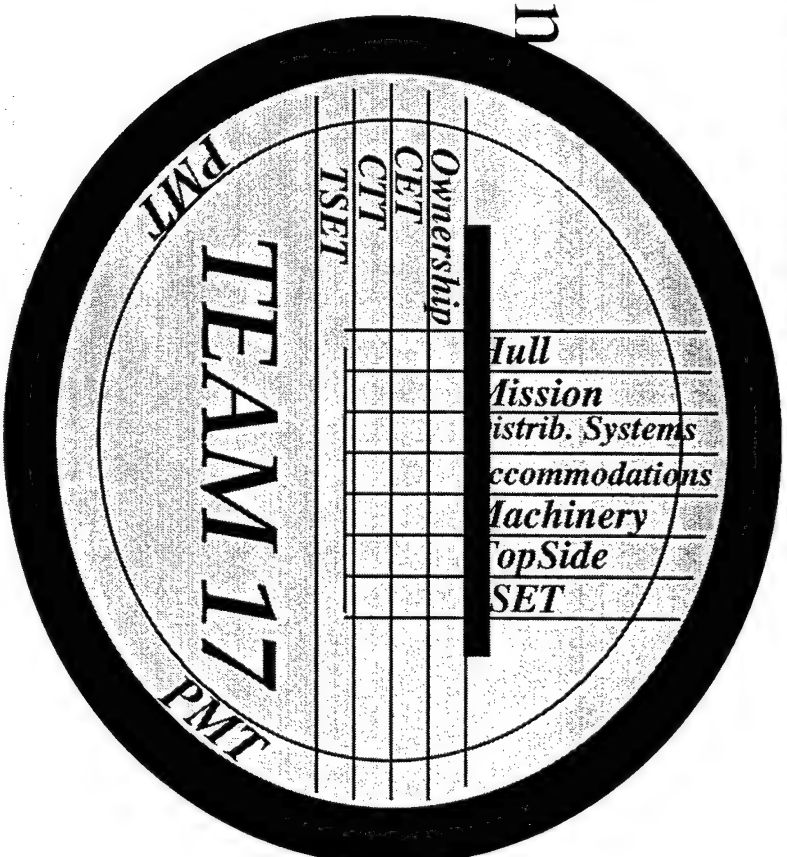
# IPPD Integrated Product Process Development



★ Early Problem Solving through Interactive Team Involvement

★ Government-Industry Collaborative Decision Making

- ★ Management Approach
- ★ Multi-Discipline
- ★ Consideration of all "View Points"



*“Enables Concurrent Engineering”*

#

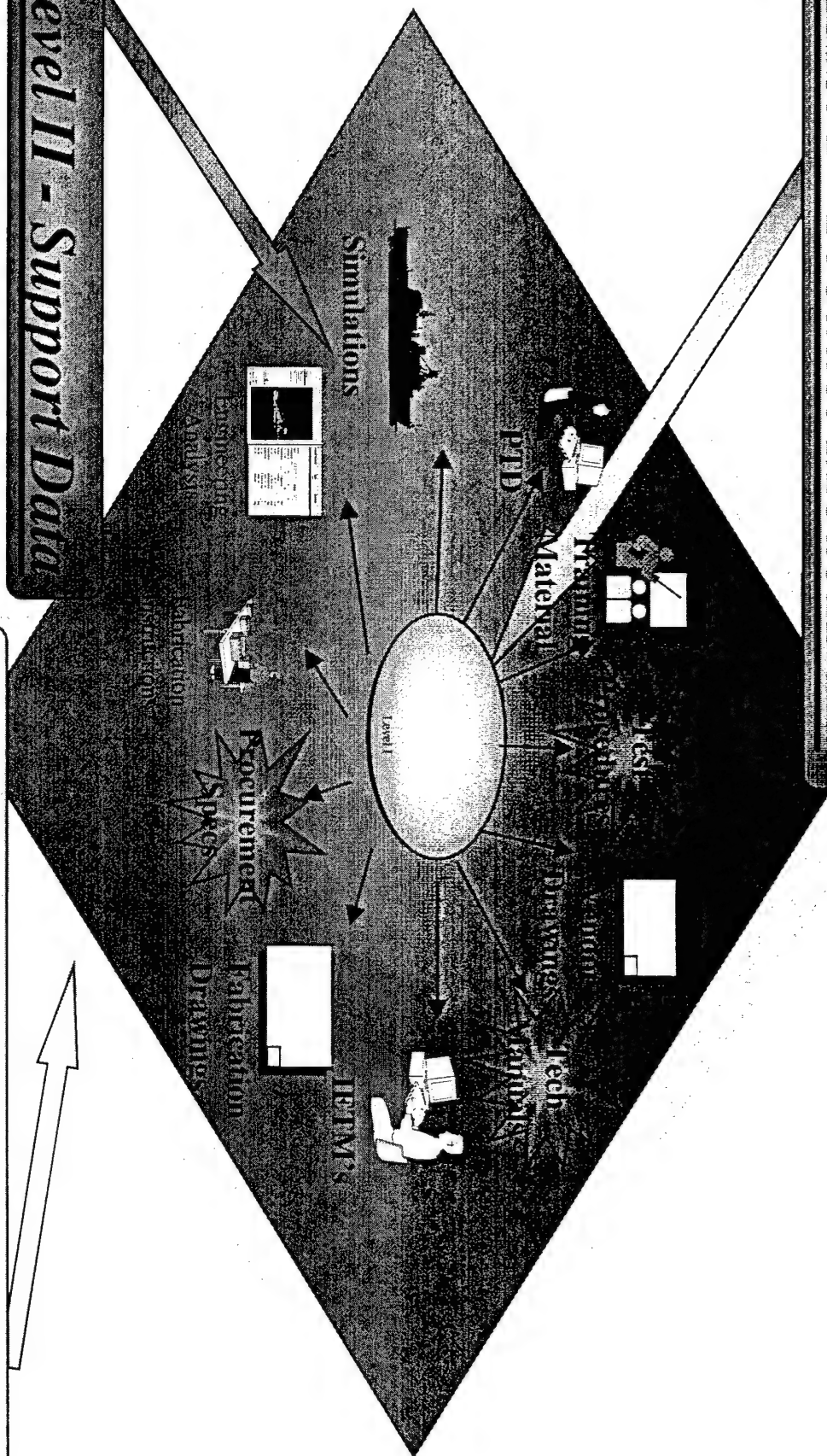
# **IPDE Concept: Electronic Development and Re-Use of Data**



**Level I - Product Model Data**

**Level II - Support Data**

**Level III - Program Execution Data**



# ***UNO / Avondale Center of Excellence***



## **First Floor**

- Test and Integration Facility (ATIF)
- UNO School of Naval Architecture
- Full Size Physical Mockup Area
- 96 Workstations

## **Second Floor (TEAM 17)**

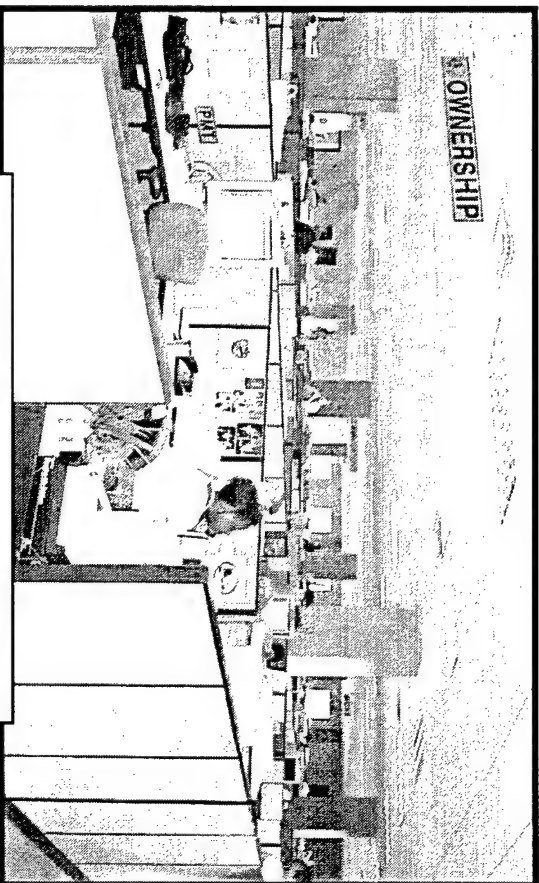
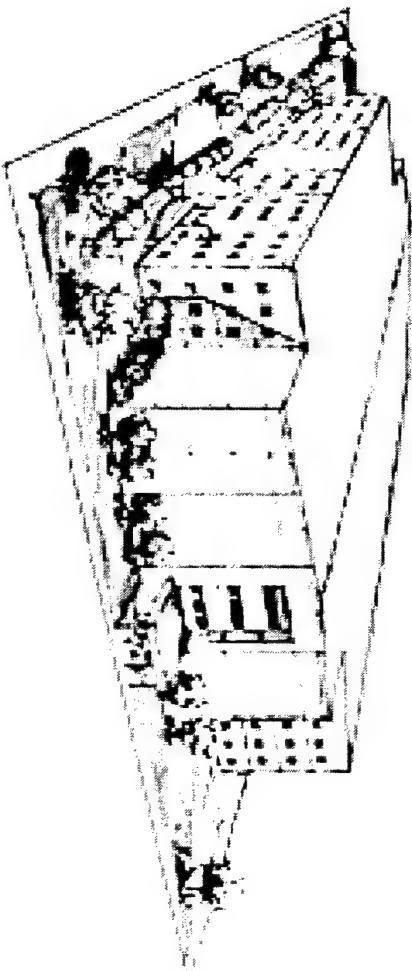
- 368 Workstations
- 2 File/Print Rooms
- 17 Team Rooms
- 1 EVS Room

## **Third Floor**

- Reserved for Future Expansion

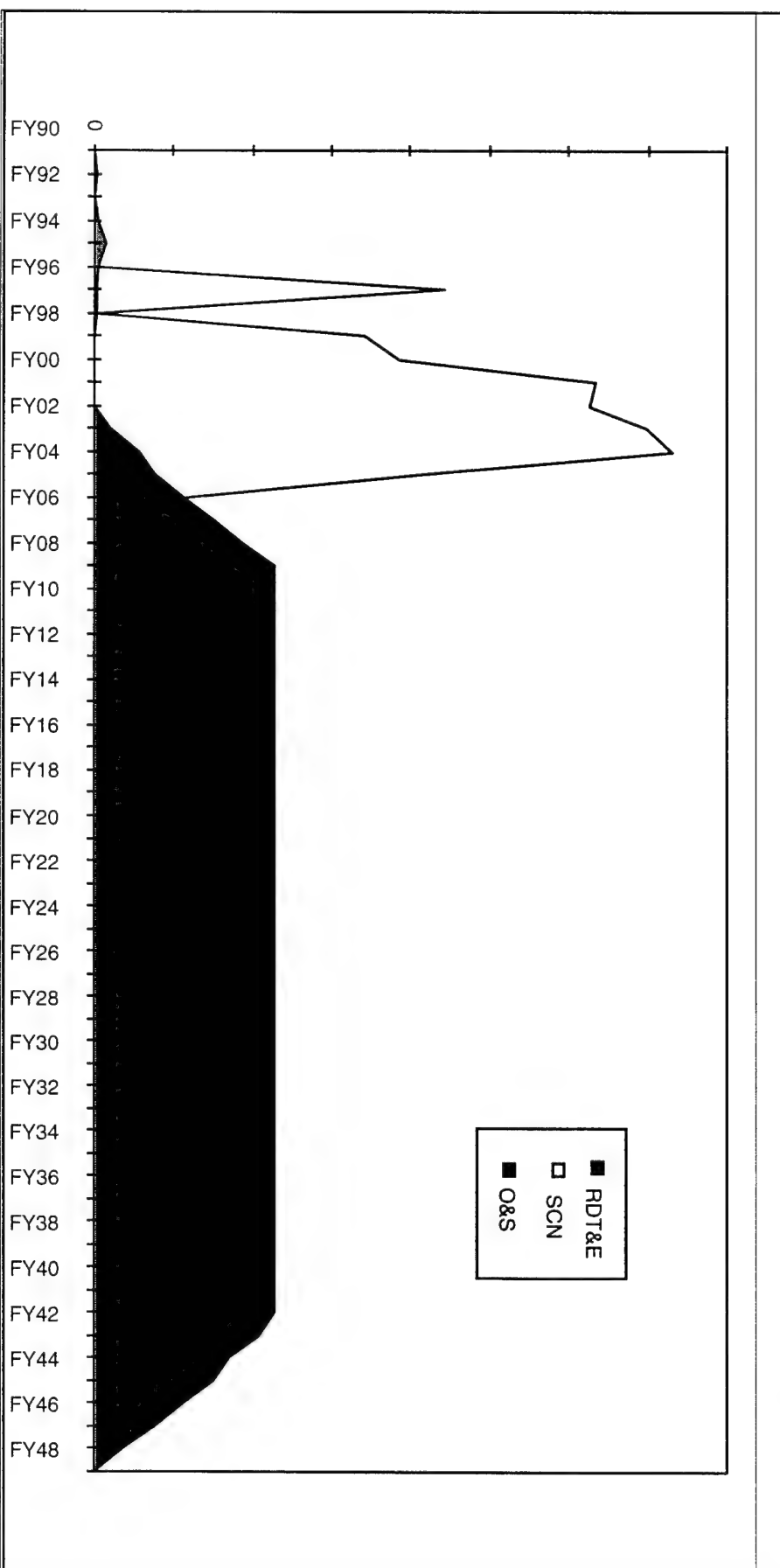
## **Fourth Floor**

- Avondale's IPDE Technology Division
- 9 Training/Conference Rooms
- 60-seat Amphitheater



**TEAM 17 Workspace**

# LPD 17 Total Ownership Cost



RD&E = .27%

SCN = 33.24%

O&S = 66.48%

*TOC Mandate: Attack O&S Cost Drivers*

# *What is LPD 17 TOC Avoidance*



**Teaming**

**Tools**

**Teaming**



**Total Progress to Date > \$2.5B**



# Design for Ownership



- Fleet/FMF Issues -
  - 89 Items in Govt review as potential design changes
  - 52 Approved or implemented as design changes

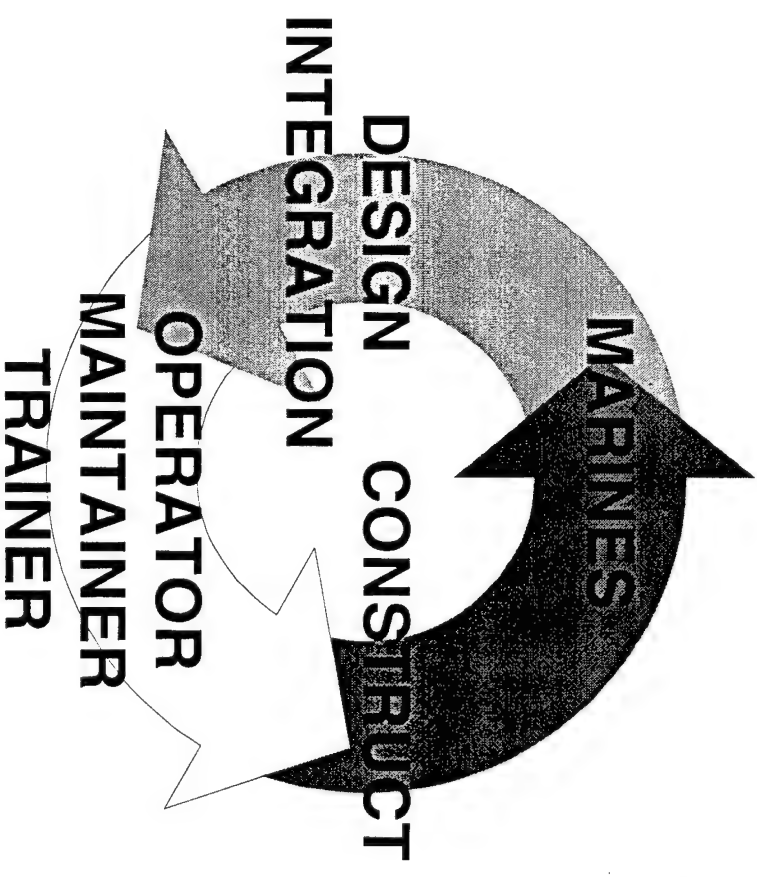
- LPD 17 Web Page

- DFO Conferences/Workshops - 39

- FLAG Briefs to TEAM 17 - 8

- Dedicated War Room at EWTGLANT

## *The Warriors*



How many times you will be

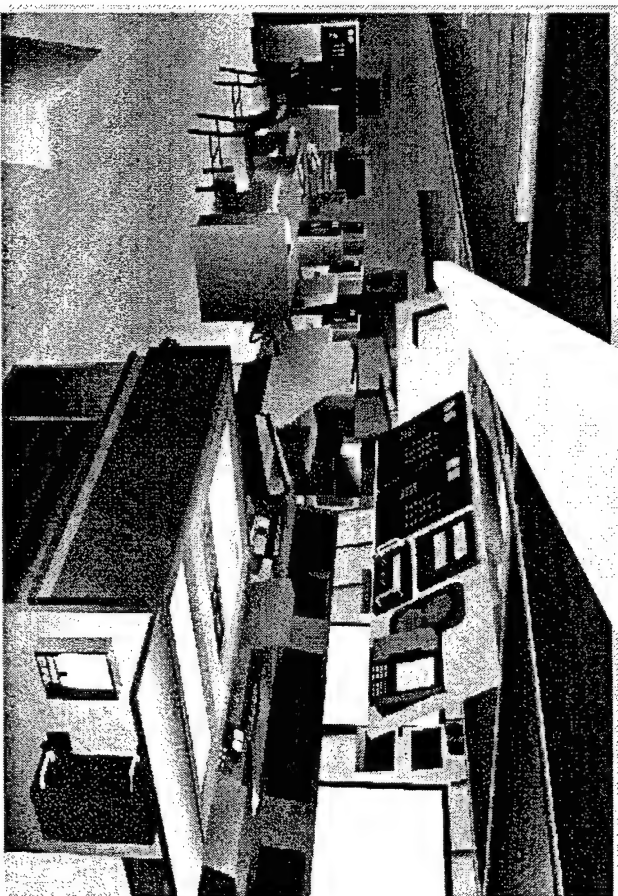
# DFO Input to LPD 17 Design - CIC and TOLC



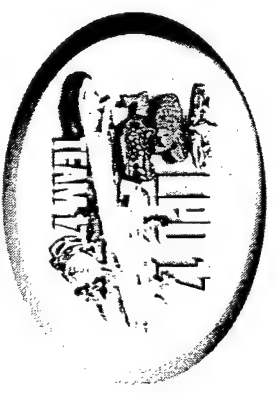
Four Warfighter and Ship Designer IPTs  
and Marine Focus Group arranged  
spaces - Final Validation in Oct 98



- ◆ • Separate but equal situational awareness
- ◆ • Proposed new joint mission planning space
- ◆ • Smart bulkhead between CIC and Troop Spaces for common flexibility and access



# **DFO and TOC Together - No Old Paradigms**



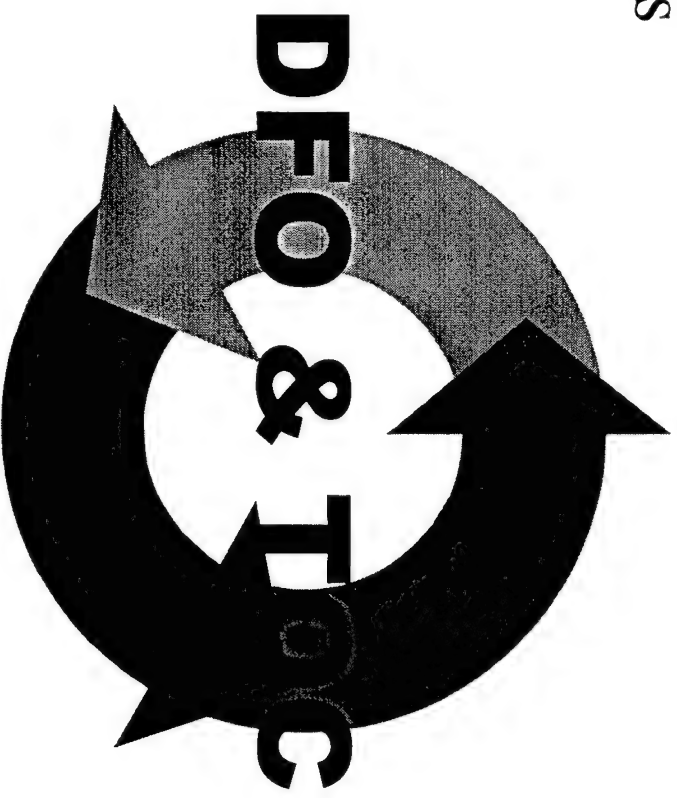
★ Fleet/Marine Corps design of CIC and Troop Ops in  
direct response to O'Grady rescue team

★ Right -sized Diesel Generators

★ Sit-up Berths for Troops  
and Crew alike

★ No HP Air

★ Advanced Enclosed Mast/Sensor



# Marine Partnership in LPD 17 Design



- Marine Officer assigned to PMS 317 - CAPT Tim Booth
- Participation in Design For Ownership process
  - *Attendance at Workshops*
  - *100+ Marine Related LPD 17 Database Issues*
- Feedback via LPD 17 Marine Day (Aug 95, Aug 96, Dec 97)



## **Marine Related Design Efforts**

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- Added aviation ordnance space to support TOW missile buildup and enhance Cobra cross decking



- New Cargo storeroom for POL added; Cargo Ammo Magazine #3 changed to support LFORM

- Working with AAAV and MV 22 Programs for Compatibility/Interface

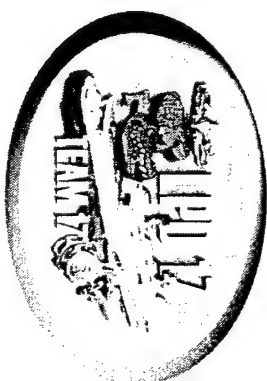


- Cooperative Design of Well Deck Control/Combat Cargo Assistance space



# *Teaming Smarter*

## *Lessons Learned (To Date!)*

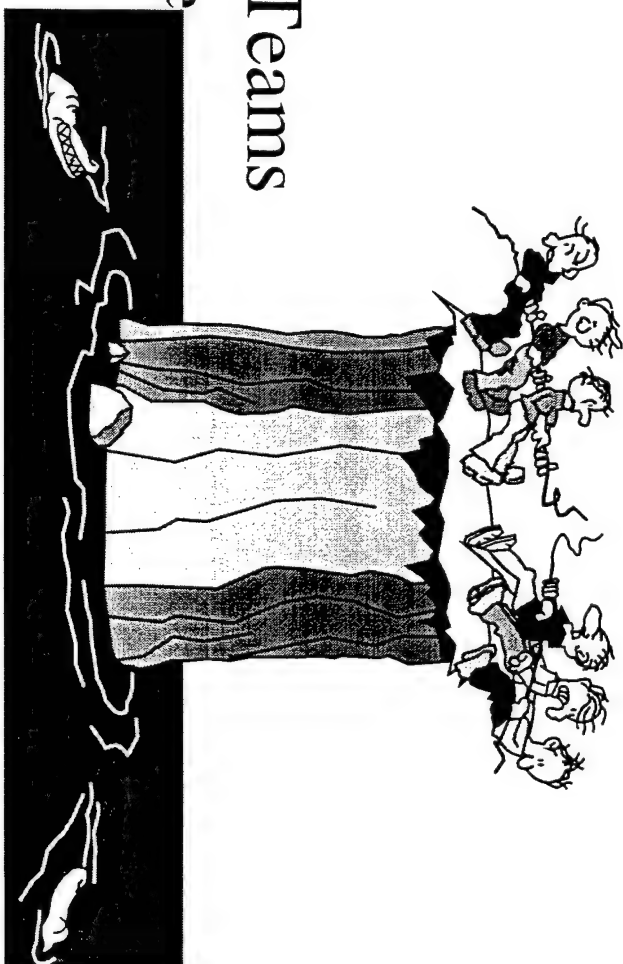


- Align Expectations
  - Contract Specifications
  - Team Goals
  - Customer Expectations

- Prepare for Teaming of Teams
  - Organizational Allegiance
  - Team Dialects

- Recognize Teams Still Need Leaders

- Direction
- Decisions
- Closure





## ***Teaming Smarter***

### **Lessons Learned (To Date!)**



- Carve Out Training Time to Blend Cultures
- Share Perspectives
- Understand Customers
- Consider Training and Executing Simultaneously
- Put Teams to Work Earlier
- “Stress” Teams - Identify Shortcomings Earlier

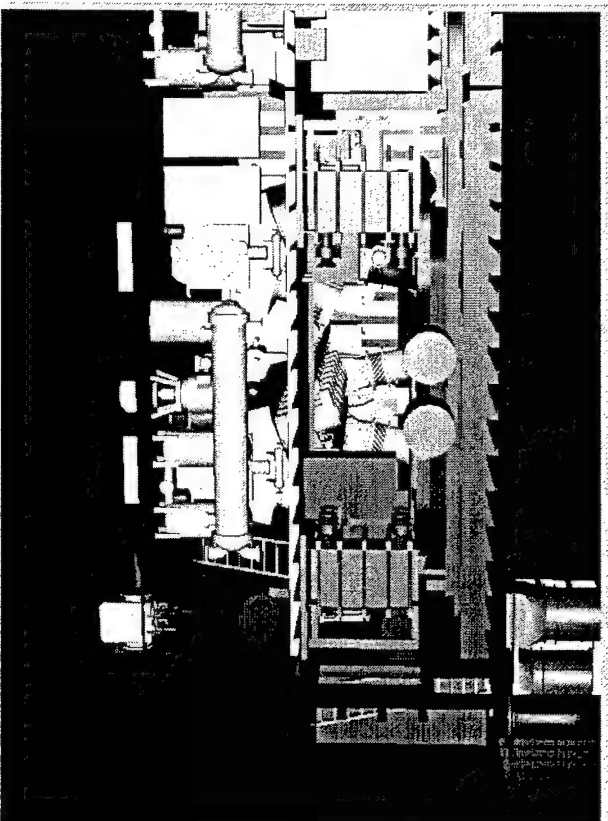
New Orleans  
Washington  
Bath  
San Diego  
Huntsville

SUPSHIPS  
SYSCOMS  
Warfare Centers  
PEOs

## ***LPD 17 Design***

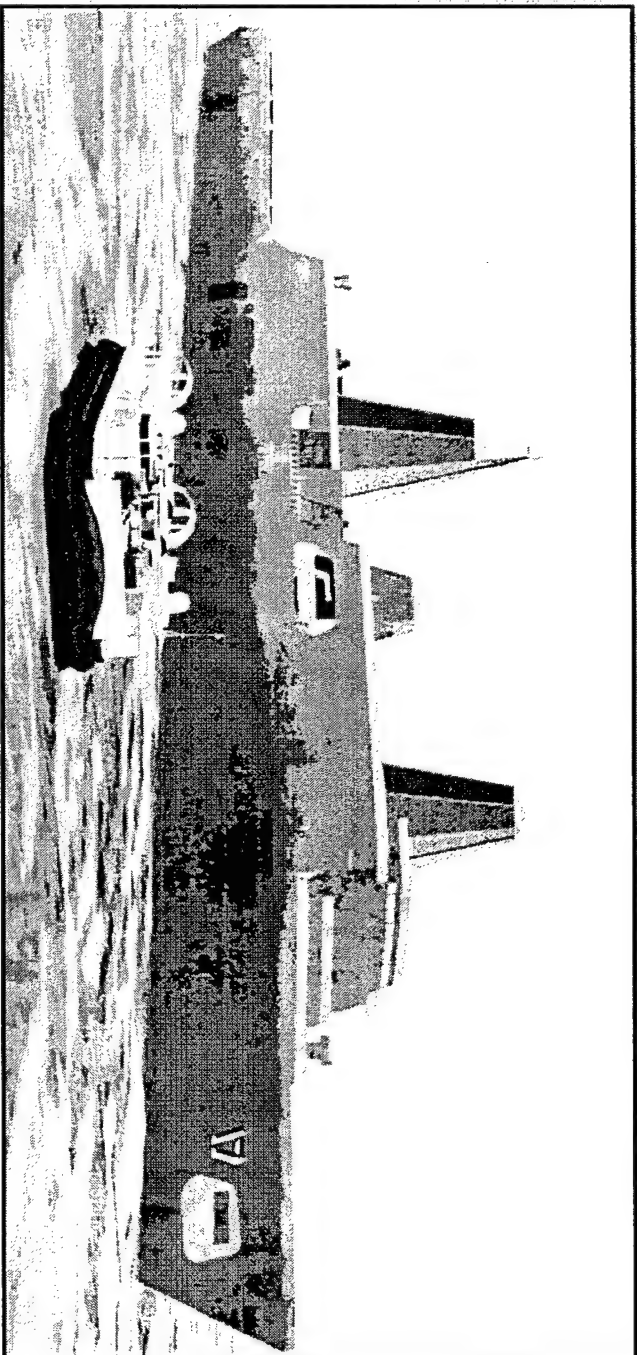
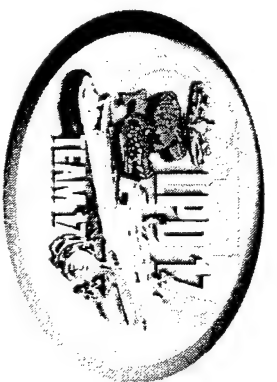


- 60% Through Detail Design Phase ➡ Cut Steel 8/99
  - Major Structure Defined
  - Well Into Systems Design
  - Initial Space Arrangements
- Design “Window For Change” Rapidly Closing
- 3-D Modeling Underway
- Configurations Being Finalized



**Team Approach Greatly Improving  
LPD 17 For the Navy/Marine Customer**

# Summary



- ◇ *Warrior-focused Design*
- ◇ *Urgent Fleet Need*
- ◇ *Aggressive Total Ownership Cost Reduction*
- ◇ *Right Ship at The Right Time*

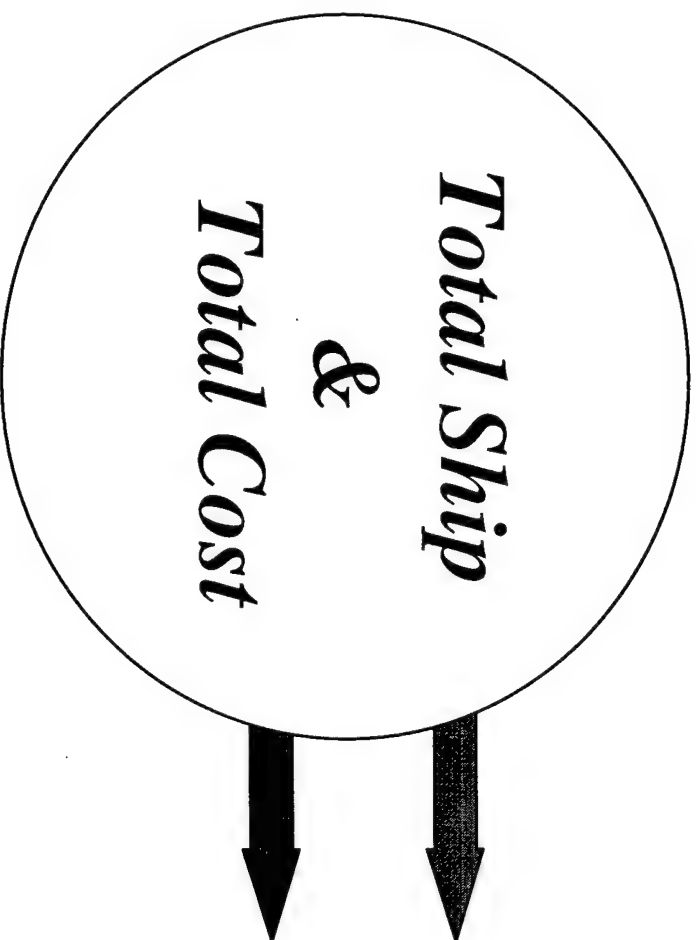
ADM David P. Sargent, Jr.  
Program Executive Officer  
of Expeditionary Warfare



**SURFACE SHIP PEO**  
**REALIGNMENT, INTEGRATION,**  
**and**  
**INNOVATION**

Presented to  
**NDIA**

**4 November 1998**



- **Vision**
- **Alignment**
- **Integration**
- **Innovation**
- **Challenges**

# NOISIA VISION



# OVERARCHING VISION

- Dedicated Flags Lead PEOs For Next Generation Ships
  - Merged accountability for combat systems and ships
- Implement “Total Ship” PEO Responsibility
  - Better focus on systems and total ship integration
- Move Rapidly To Common Combat System Architecture In All Ships
  - Maximize resource flexibility and best practices & processes across programs
- Co-manage Programs Related To Fielding TMBD Capability

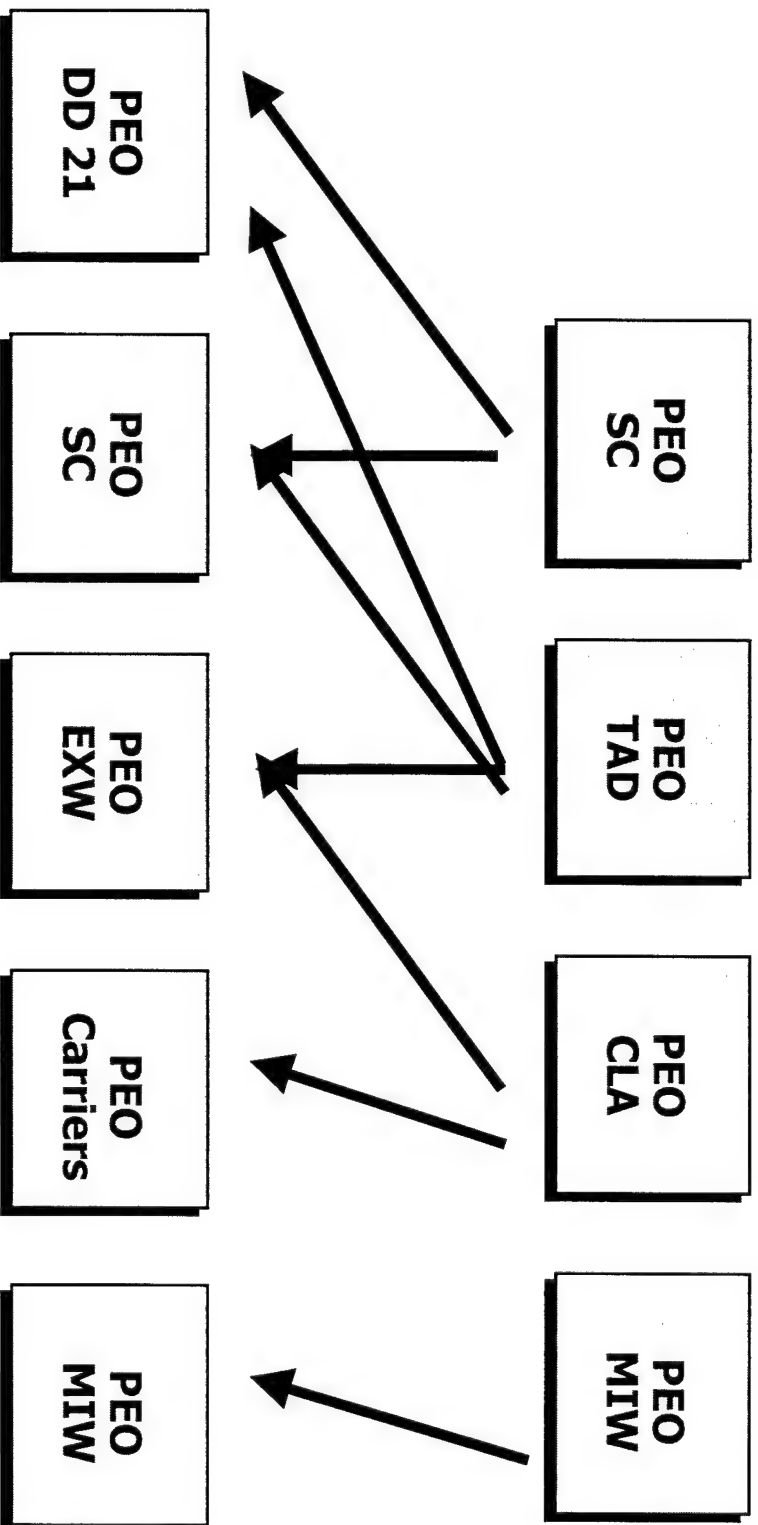
## **ASN(RDA) DIRECTION**

**“Ship self defense programs currently managed by the Program Executive Officer for Theater Air Defense (PEO TAD) will be transferred to PEO CLA, Less Combat Direction Systems.”**

**(6 Mar 1998 ltr)**

# ALIGNMENT

# NEW PEO STRUCTURE



# PROGRAM EXECUTIVE OFFICE FOR EXPEDITIONARY WARFARE (PEO EXW), PROGRAM EXECUTIVE OFFICE FOR CARRIERS (PEO CARRIERS), AND SURFACE SHIP DIRECTORATE (SEA 91)

**PEO EXW**  
**RADM DAVID P. SARGENT, Jr.**  
 DEPUTY PEO  
**MR. JESSE A. ATKINS (SES)**

(Double-Hatted)

**DEPUTY COMMANDER**  
 (SEA 91)  
**MR. JESSE A. ATKINS (SES)**  
 EXECUTIVE DIRECTOR  
 (SEA 91B)  
**MR. ED SHELTON (SES)**

**PEO CARRIERS**  
**CAPT J. MANVEL**  
 (Acting)

**CHIEF OF STAFF**  
 (EXW-C)  
**CAPT C. WILSON**  
**DEPUTY FOR COMBAT SYSTEMS**  
 (EXW-D)  
**VACANT**  
**DEPUTY FOR PROGRAM INTEGRATION**  
 (EXW-P)  
**VACANT**

**COAST GUARD LIAISON**  
 (EXW-G)  
**CDR D. MACLEOD**  
**MARINE CORPS ADVISOR**  
 (EXW-M)  
**COL M. QUINLAN, USMC**

**SUPPORT FOR PEO EXW & PEO CARRIERS**  
**TEAM CX**  
**CORPORATE OPERATIONS OFFICE**  
**SEA 91C0**  
**DIR: MR. J. BAILEY**

**AIRCRAFT CARRIER PROGRAM**  
**PMS 312**  
**PM: CAPT C. BUSH (ACTG)**  
**CAPT(S) J. KAMEN (ACTG)**  
**DPM: MS. E. ROBERSON (SES)**  
**CVX PROGRAM**  
**PMS 378**  
**PM: CAPT J. MANVEL**  
**DPM: MR. B. PERSONS**

**SPECIAL ASSISTANT TO SEA 91**  
 (SEA 91D)  
**MR. D. JUNG**

**FOREIGN COMPARATIVE TESTING PROGRAM OFFICE**  
 INSENSITIVE MUNITIONS PROGRAM OFFICE  
 NATIONAL SHIPBUILDING RESEARCH PROGRAM  
 TEST AND EVALUATION OFFICE  
 BUSINESS PROCESS ASSISTANT  
 ACQUISITION SUPPORT OFFICE  
**SEA 91FCT**  
**SEA 91M**  
**SEA 91R**  
**SEA 91T**  
**SEA 91X**  
**SEA 91Y**

**MS. S. ALLEN**  
**DR. R. BOWEN**  
**MR. A. DIVENS**  
**MR. M. REYNOLDS**  
**MS. G. MCCARTHY**  
**MR. D. CATALANO**

**BUSINESS AND FINANCIAL MANAGEMENT**  
**PMS 305**  
**PM: MR. J. ROBERSON**

**LOGISTICS MANAGEMENT**  
**PMS 306**  
**PM: MR. A. VALLO**

**SUPPORT SHIPS, BOATS AND CRAFT PROGRAM**  
**PMS 325**  
**PM: CAPT D. KITCHIN**  
**DPM: MR. A. FERGUSON**

**SURFACE SHIP INACTIVATION AND DISPOSAL PROGRAM**  
**PMS 333**  
**PM: CAPT G. HALL**

**LPD 17 AMPHIBIOUS TRANSPORT DOCK SHIP PROGRAM**  
**PMS 317**  
**PM: CAPT W. LUEBKE**  
**DPM: MR. G. PICKENS**

**U.S. COAST GUARD ICEBREAKER PROGRAM**  
**PMS 373**  
**PM: CAPT G. JOHNSON**  
**DPM: MR. A. JURJANS**

**AMPHIBIOUS WARFARE PROGRAM**  
**PMS 377**  
**PM: CAPT T. GORSKI**  
**DPM: MR. M. WALDMAN**

**SHIP DONATION PROGRAM**  
**PMS 334**  
**PM: MR. T. DEMAS**  
**DPM: MS. G. CARVALHO**

**COMBAT SYSTEMS TRAINING PROGRAM**  
**PMS 430**  
**PM: MR. M. O'NEAL**  
**DPM: CDR D. BEACH**

**DETECTION, NAVIGATION AND PROCESSING SYSTEMS PROGRAM**  
**PMS 440**  
**PM: CAPT M. CROCKER**  
**DPM: MR. E. DARDEN**

**STRATEGIC SEALIFT PROGRAM**  
**PMS 385**  
**PM: MR. R. LISIEWSKI (SES)**  
**DPM: CAPT J. EXELL**

**ENGINEERING MANAGEMENT**  
**PMS 307**  
**PM: MR. W. SMOTHERS**

**SUPERVISOR OF SALVAGE AND DIVING**  
**SEA 00C**  
**DIR: CAPT R. MCCORD**  
**DEP: MR. R. ASHER**

**SECURITY ASSISTANCE PROGRAM**  
**PMS 380**  
**PM: MR. R. BOYD (ACTING)**  
**DPM: CDR J. DAVIS (ACTING)**

**NATO SEASPARROW PROGRAM**  
**PMS 471**  
**PM: CAPT K. TACKETT**  
**DPM: MR. A. COTE**

**RAM/PHALANX PROGRAM**  
**PMS 472**  
**PM: CAPT C. BOURNE**  
**DPM: MR. C. STEIN**

**COMBAT SYSTEMS ENGINEERING & INTEGRATION PROGRAM**  
**PMS 444**  
**PM: CAPT LES CARTER**

**SHIPS & SYSTEMS ACQUISITION MANAGEMENT**  
**PMS 308**  
**PM: MR. J. CAMERON**



9/98

*PEO Expeditionary Warfare*

*PEO Carriers*



*SEA 91*

*(Surface Ship Directorate)*



# ACAT PROGRAMS

## PEO CLA PRIOR TO REALIGNMENT

ACAT	ID	--	3
ACAT	IC	--	3
ACAT	II	--	1
ACAT	III	--	6
ACAT	IV	--	11
ACAT TOTAL =			24

## AFTER REALIGNMENT

### PEO EXW

ACAT	ID	--	2
ACAT	IC	--	2
ACAT	II	--	4
ACAT	III	--	7
ACAT	IV	--	12
ACAT TOTAL =			27

### PEO CARRIERS

ACAT	ID	--	1
ACAT	IC	--	1
ACAT	II	--	0
ACAT	III	--	0
ACAT	IV	--	0
ACAT TOTAL =			2

# PEO EXW PROGRAMS

## SHIPS (124)

## COMBAT SYSTEMS

## OTHER

•AMPHIBS

★NSSMS

•SHIP INACT & DISPOSAL

•LCAC

★RAM/CIWS

OF ALL CONVENTIONALLY

•LHD

★IRST

POWERED SURFACE SHIPS

•LSD/LPD

★TISS

•SHIP DONATION PROGRAM

•LHA

★RADARS

•BFTT / JSIMS

•LPH

★SPS-48

•SPECWAR PC &

•COMMAND SHIPS

•LCC

★SPS-73

SUPPORT PROGRAMS

•AGF

★SPQ-9B

•BOATS & SERVICE CRAFT

•AUXILIARIES

★MK 23 TAS

•PATROL CRAFT FMS

•AGOR

•DISPLAYS

•SURFACE TARGETS

•AOE

•Q-70

•JCC (X)

•T-SHIPS

•NAVIGATION

•ADC (X)

•T-AGOS

•RLGN

•PLRS/EPLRS CMND&CNTRL

•TAGS

•DSVL

•AN/KSQ-1

•TAE

•PROCESSORS

•TAFS

•WAGB-20 (HEALY)

•UYK-43

•TAKR (SEALIFT)

•UYK-44

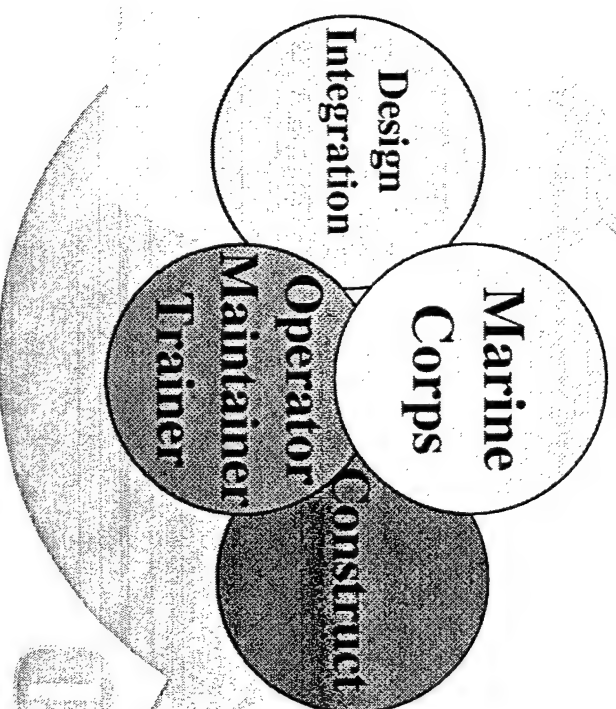
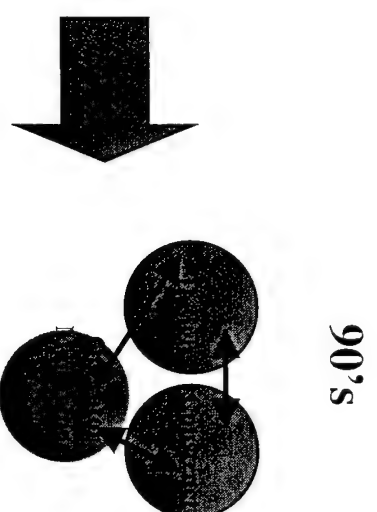
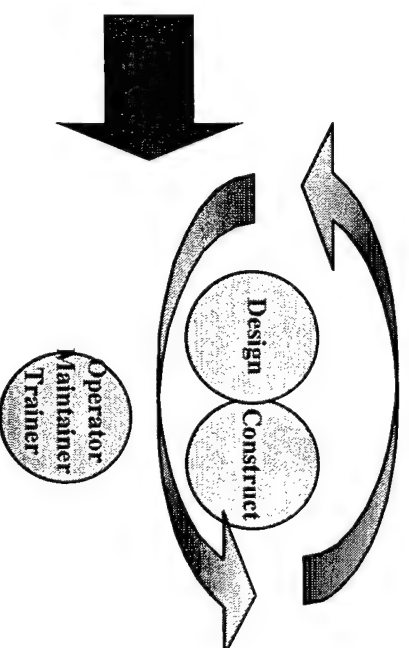
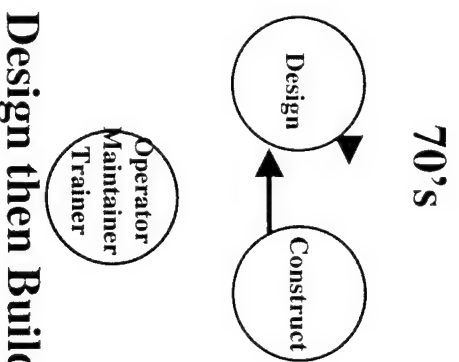
•USS CONSTITUTION

★SELF DEFENSE  
SYSTEMS

# INTEGRATION

# NEXWE IPT grew out of

## Design for Ownership Concept



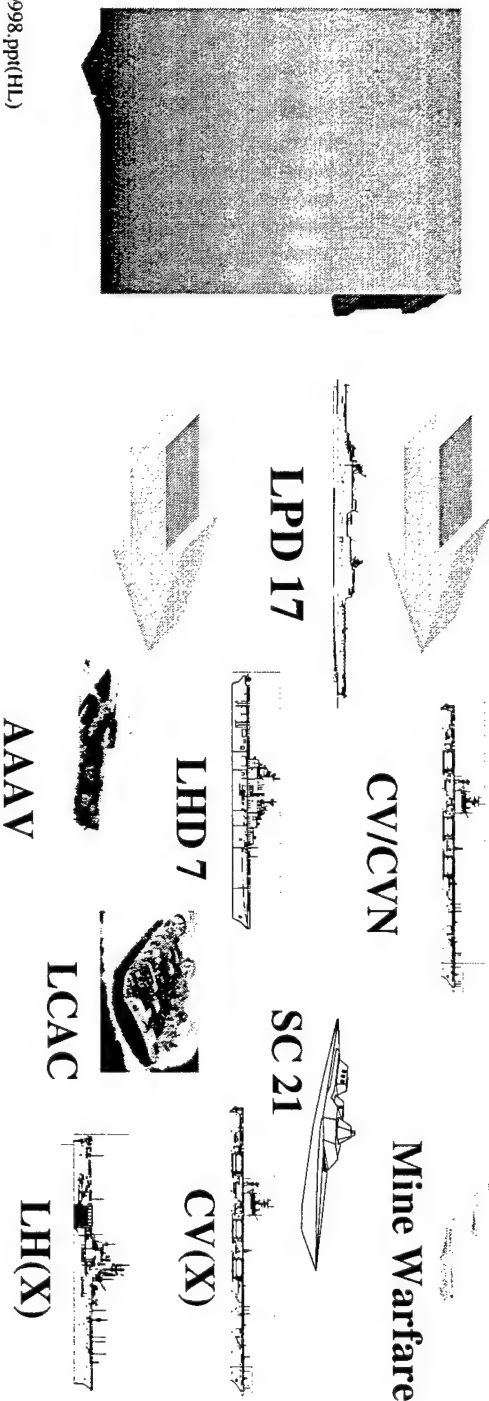
Ownership



# NEXWE IPT Mission Statement

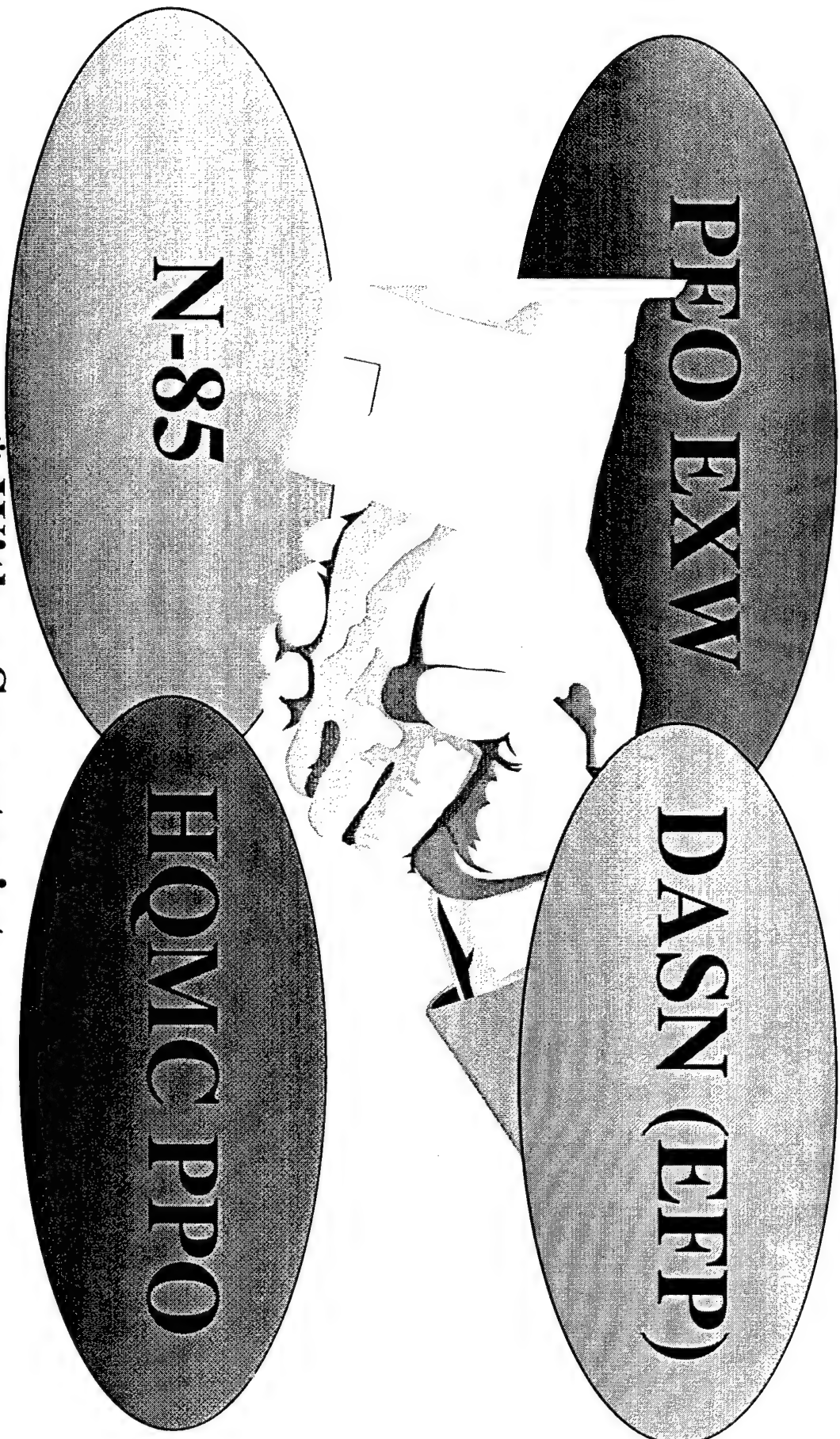
To integrate the engineering development of the family of Expeditionary Warfare Programs with the policy, requirements and acquisition process as well as with the warrior, maintainer and trainer in systems of systems approach.

310





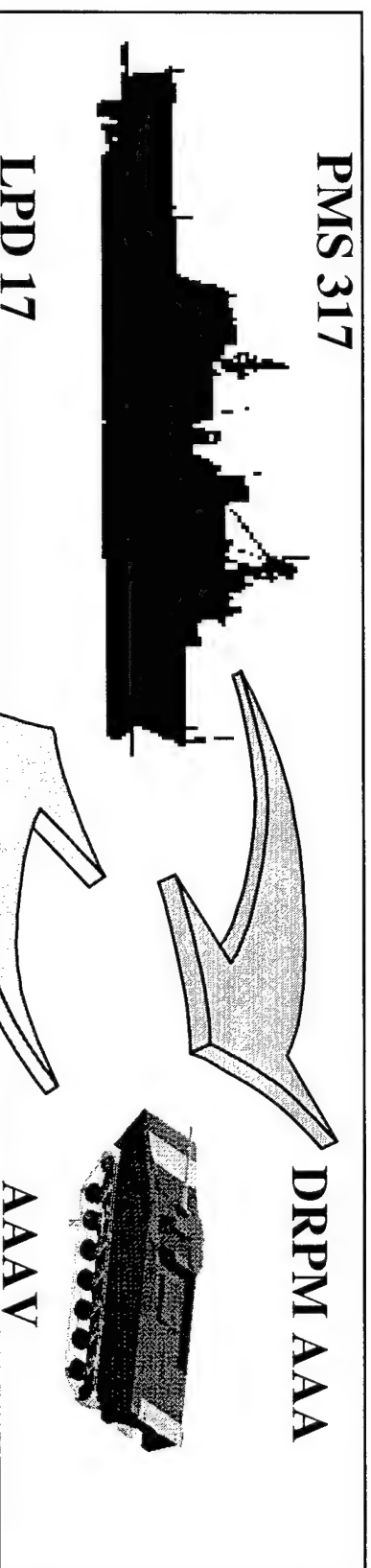
## Co-Sponsors



**\* With a Secretariat**



# The First Step



## • Success early...

- DRPM AAA & PMS 317 Empowered to act
- More than just Space/Wt/Cube
  - Well Deck Power requirements
  - LAN drops
  - On Board Training issues
  - Vehicle Maneuverability
  - Nitrogen systems
  - JP5-JP8 issues

## • ...led to a broader concept of E W Systems Integration...

- LPD 17 Warroom (at LCRK) -- “Sea Water Inlet”
- Designers, Operators, Maintainers, Trainers & Constructors involved earlier in the process
- ...and gave rise to the NEXWE IPT as a Process.



# Direction for 21st Century



NEXWE IPT  
(REALITY)

Combined OPS

Joint OPS

Integrated Battle OPS

CVBG

ARG

LPD 17

Systems

System of Systems

FOCUS

# INNOVATION

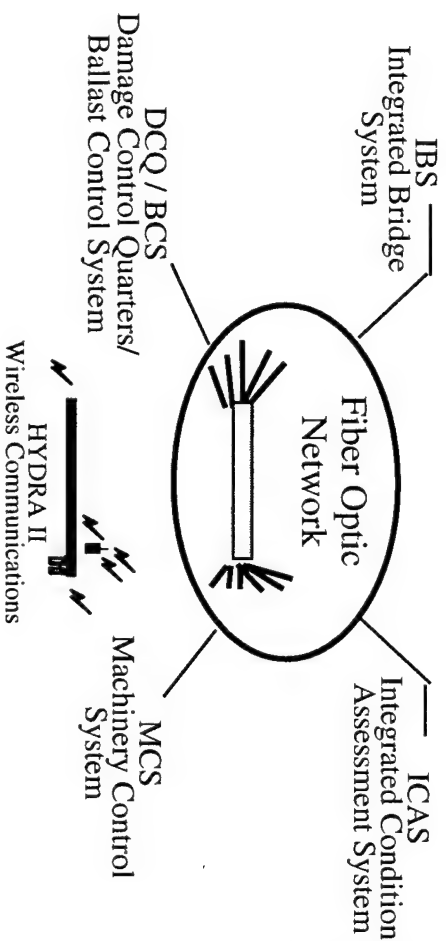
# SMART GATOR GOALS

- Demonstrate major workload reductions while maintaining/improving readiness
- Rapid insertion of promising technologies for LPD-17 detail design
- Developing a Back Fit Plan for the Amphibious Fleet



# USS RUSHMORE: SMART GATOR

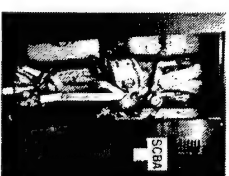
## Enabling Technologies



## Other Installed Systems



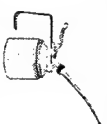
Advanced Fire & Smoke Sensing System (AFSSS)



Self Contained Breathing Apparatus (SCBA)



Plastic Waste Processor (PWP)



Commercial Oil Program (Mobil)



Regular Ballast Tank Monitoring

## Equip. / Maint. Reductions

- PMS Deck review
- Reliability Centered Maintenance
- Streamlined equipment deletion process

## Policy / Procedure

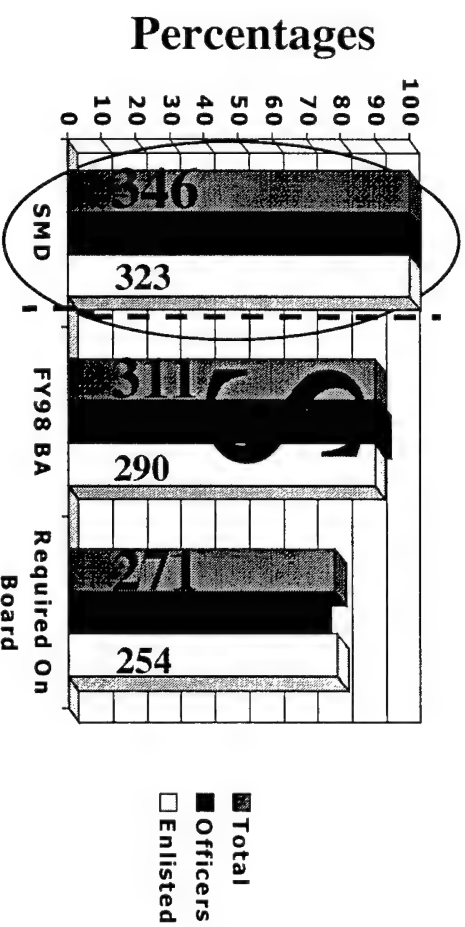
- Watchstanding reduction
  - Bridge
  - Engineering
  - Inport Quarterdeck
- Damage Control Q
- EOSS changes

# SMART GATOR BACK FIT PLAN

**ENABLE** significant reductions in the workload required to fight and maintain the ship.

## MANAGEMENT APPROACH:

- Team oriented with significant Fleet involvement
- Objective, fact-based, disciplined, and repeatable
- Focused on maximizing Return on Investment (ROI)
- Coordinated with other programs
- Built upon Cruiser Back Fit Lessons Learned.



## INVESTMENT ANALYSIS:

- Potential Savings From Workload Reduction = \$3.11M/yr/ship
- Life Cycle Cost Avoidance = \$74M/ship
- Cost Avoidance For LSD 41/49 Class = \$888M



# CHALLENGES FOR INDUSTRY

- TOTAL OWNERSHIP COST (TOC)
  - Affordability is paramount
  - CAIV is modus operandum
  - Cradle to grave support, if affordable, is preferred
  - Look to minimize infrastructure impacts
  - Drive to ultra reliability/reduced manning
- NAVY ORGANIZATIONAL REALIGNMENTS
  - Will continue...need industry to be flexible
- DEFENSE INDUSTRY ENGINEERING BASE
  - Government side of equation changing rapidly
  - How can industry help sustain?
- AN EDUCATED CONSUMER IS YOUR BEST CUSTOMER
  - Invest in government / decision maker education

# BACK UP

## **TEAM CX MISSION**

**The people of TEAM CX develop, acquire and provide life cycle support of affordable ships, systems, and ordnance that are operationally superior so that our Nation and its allies are prepared to protect and defend our national interests.**

## **TEAM CX VISION**

**TEAM CX will lead the way into the 21st century and beyond as the SUPPLIER OF CHOICE for ships, systems, ordnance, and services.**

# **TEAM CX VALUES**

We in TEAM CX reaffirm the NAVSEA Guiding Principles of:

- Responsiveness
- Communication
- Integrity
- Technical Excellence
- Empowerment
- Accountability
- Respect
- Business Practices
- Diversity
- Teamwork
- Productive Workplace

322

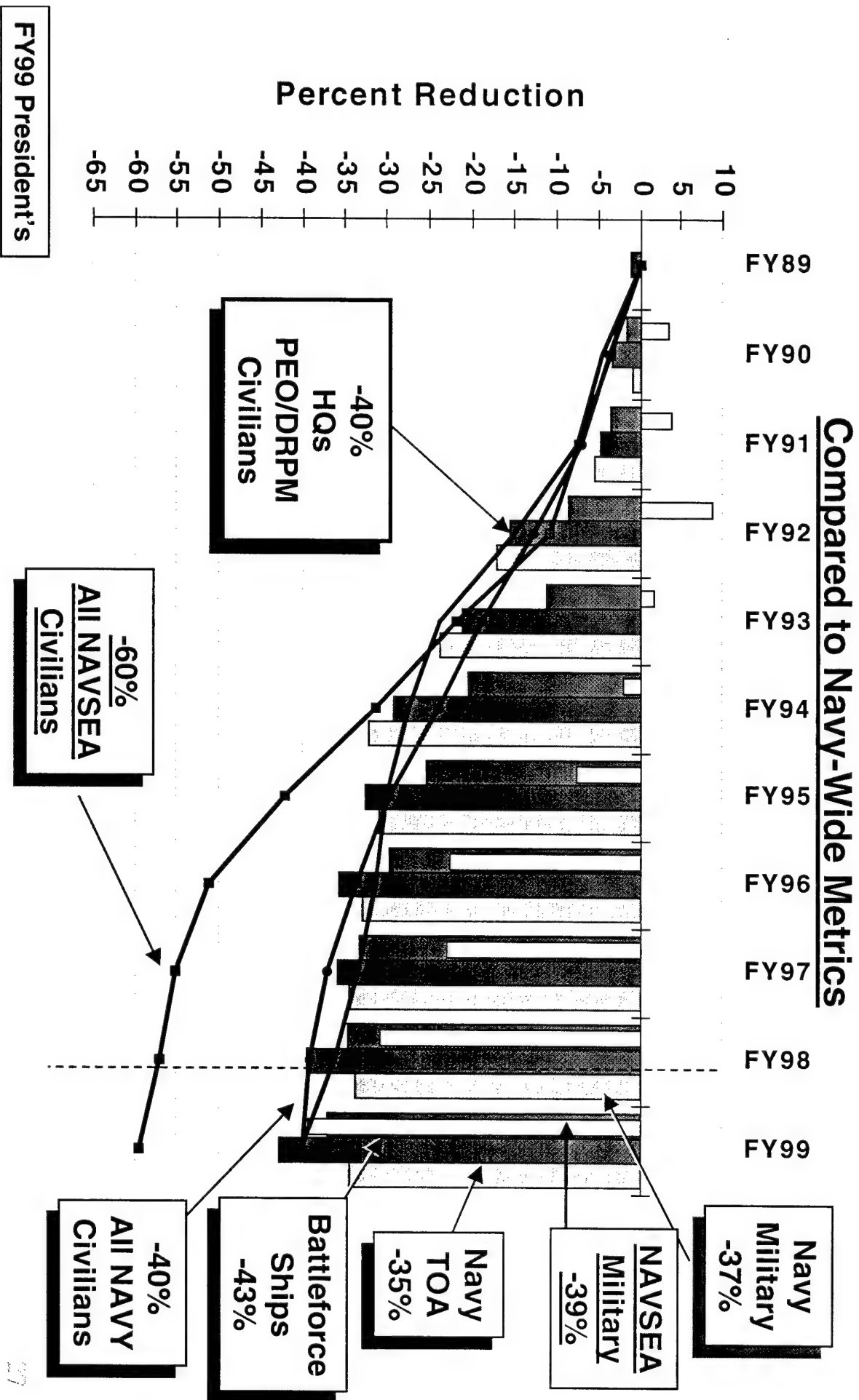
TEAM CX also values:

- Innovation: The ability to anticipate, influence and adapt to a changing environment with an open-minded approach and creativity; consider diverse ideas; be willing to take prudent risk; be tolerant of risk-based failure.

- Commitment: The unrelenting pursuit of excellence, measured in quality and competence in every endeavor.

Commitment is the value that establishes TEAM CX members as the acquisition professional others strive to emulate.

# COMMAND-WIDE REDUCTIONS





# TEAM CX MANPOWER

Civilian					Military				
SES	GS-15	GS-14	GS-13	GS1-12	ADM	CAPT	CDR	LCDR	
4/13/98	4	56	106	250	172	1	17	16	11
9/98 *	4	58	117	270	173	1	21	17	11

\* Includes PEO TAD Transfers

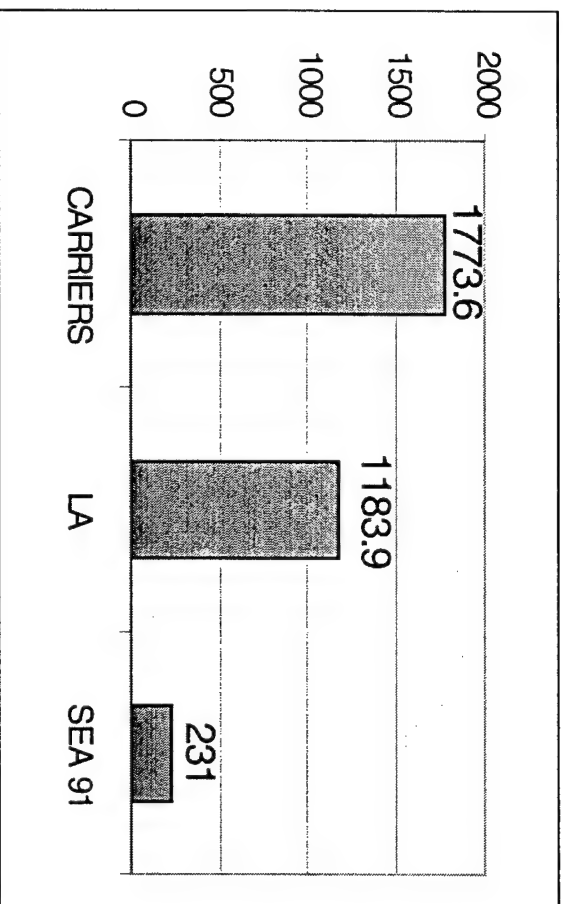
324

# MULTIPLE SPONSORS

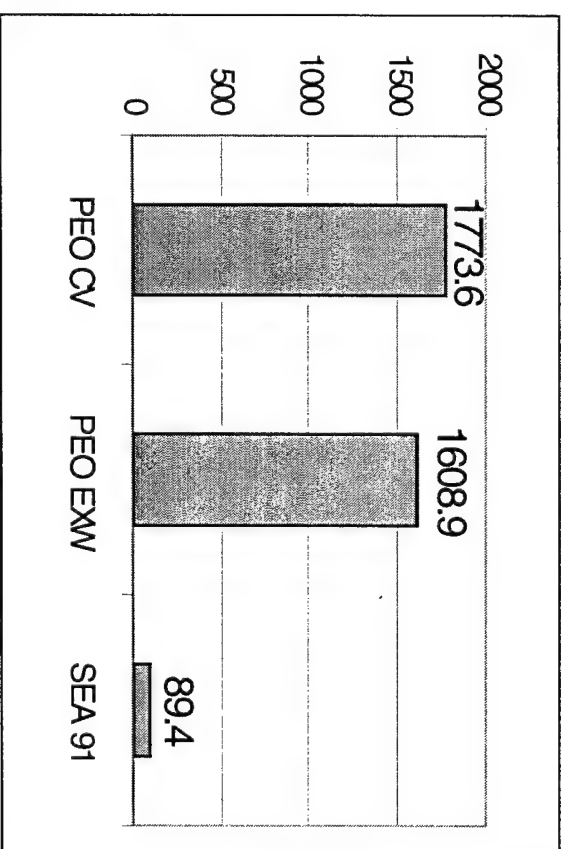
PEO EXW	PEO CV	SEA 91	PEO TAD TRANSFERRED
N4	N88	N42	N86
N42		N45	
N43		N85	
N45		N86	
N6		N87	
N65		N88	
N73			
N85			
N86			
N87			
N88			
N91			
SOCOM			

# FY 98 BUDGET PROFILE (\$M)

## PRIOR TO REALIGNMENT



## AFTER REALIGNMENT



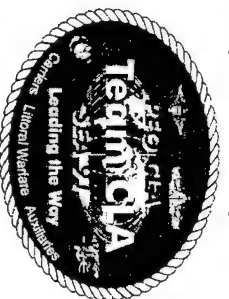
# PROGRAM EXECUTIVE OFFICE FOR CARRIERS, LITTORAL WARFARE & AUXILIARY SHIPS (PEO CLA) SURFACE SHIP DIRECTORATE (SEA 91)

**PROGRAM EXECUTIVE OFFICER**  
RADM DAVID P. SARGENT, Jr.  
DEPUTY PEO  
MR. JESSE A. ATKINS (SES)

(Double-Hatted)

**DEPUTY COMMANDER**  
(SEA 91)  
MR. JESSE A. ATKINS (SES)  
EXECUTIVE DIRECTOR  
(SEA 91B)  
MR. ED SHELTON (SES)

**SPECIAL ASSISTANT TO THE DEPUTY COMMANDER**  
(SEA 91D)



COAST GUARD LIAISON  
(CLA-G)

CHIEF OF STAFF  
(CLA-C)

MARINE CORPS ADVISOR  
(CLA-M)

AIRCRAFT CARRIER PROGRAM  
PMS 312

LPD 17 AMPHIBIOUS TRANSPORT DOCK SHIP PROGRAM  
PMS 317

SUPPORT SHIPS, BOATS AND CRAFT PROGRAM  
PMS 325

SURFACE SHIP INACTIVATION AND DISPOSAL PROGRAM  
PMS 333

U.S. COAST GUARD ICEBREAKER PROGRAM  
PMS 373

AMPHIBIOUS WARFARE PROGRAM  
PMS 377

CVX PROGRAM  
PMS 378

STRATEGIC SEALIFT PROGRAM  
PMS 385

COMBAT SYSTEMS TRAINING PROGRAM  
PMS 430

## PEO CLA SUPPORT

PEO CLASEA 91 CORPORATE OPERATIONS OFFICE  
SEA 91C0

BUSINESS AND FINANCIAL MANAGEMENT  
PMS 305

LOGISTICS MANAGEMENT  
PMS 306

ENGINEERING MANAGEMENT  
PMS 307

SHIPS & SYSTEMS ACQUISITION MANAGEMENT  
PMS 308

ACQUISITION REFORM OFFICE.....SEA 91AR  
FOREIGN COMPARATIVE TESTING PROGRAM OFFICE.....SEA 91FCT  
INSENSITIVE MUNITIONS PROGRAM OFFICE.....SEA 91M  
PRODUCT INTEGRITY AND ASSESSMENT OFFICE.....SEA 91Q  
NATIONAL SHIPBUILDING RESEARCH PROGRAM.....SEA 91R  
TEST AND EVALUATION OFFICE.....SEA 91T  
ACQUISITION SUPPORT OFFICE.....SEA 91Y

SUPERVISOR OF SALVAGE AND DIVING  
SEA 00C

SURFACE SHIP MAINTENANCE DIVISION  
SEA 915

SECURITY ASSISTANCE PROGRAM  
PMS 380

COMBAT SYSTEMS DIVISION  
SEA 91K

WARFARE SYSTEMS GROUP  
SEA 91W

**Team CLA Prior to 4/98 Reorganization**

# PEO EXW/SEA 91 ACAT Programs-- Today

ID	PMS317	LPD 17 AMPHIBIOUS TRANSPORT DOCK SHIP (FORMERLY LX)	ACAT	ID	--	2
ID	PMS325	AUXILIARY DRY CARGO CARRIER/ ADC(X)*	ACAT	IC	--	2
IC	PMS377	LHD 1 AMPHIBIOUS ASSAULT SHIP	ACAT	II	--	4
IC	PMS385	STRATEGIC SEALIFT	ACAT	III	--	7
II	PMS471	EVOLVED SEASPARROW MISSILE (ESSM)	ACAT	IV	--	12
II	PMS472	5" ROLLING AIRFRAME MISSILE (RAM) BLOCK 0)/(MK-31)				
II	PMS472	PHALANX IMPROVEMENT PROGRAM				
II	PMS472	5" ROLLING AIRFRAME MISSILE (RAM) PROGRAM BLOCK I				
III	PMS325	PC 1 CYCLONE CLASS COASTAL PATROL SHIP (FORMERLY PBC PCC)				
III	PMS325	T-AGS 60 CLASS OCEANOGRAPHIC SURVEY SHIP				
III	PMS325	AGOR 24 OCEANOGRAPHIC RESEARCH VESSEL				
III	PMS373	COAST GUARD POLAR ICEBREAKER				
III	PMS377	COMMAND & CONTROL SYSTEM FOR AN/KSQ-1				
III	PMS385	MARITIME PREPOSITIONING FORCE (ENHANCED)/ MPF(E)				
III	EXW-D	AN/SPQ-9B RADAR IMPROVEMENT(ASMD)(ANTI-SHIP MISSILE DEFENSE)				
IVT	PMS440	AN/WSN-7 RING LASER GYROSCOPE NAVIGATOR (RLGN)				
IVT	PMS440	COMPUTER AIDED DEAD RECKONING TRACER (CADRT)				
IVT	PMS440	AN/WQN-2 DOPPLER SONAR VELOCITY LOG (DSVL)				
IVT	PMS440	ADVANCED DISPLAY SYSTEM (ADS) /AN/UYQ-70(V)				
IVT	SEA 00C	SUBMARINE RESCUE DIVING AND RECOMPRESSION SYSTEM (SRDRS)				
IVM	EXW-D23	THERMAL IMAGING SENSOR SYSTEM (TISS)				
IVM	PMS325	SPECIAL OPERATION FORCES LASER MARKER (SOFLAM) AN/PEQ-1				
IVM	PMS325	BARRACKS CRAFT - SMALL (APL(S))				
IVM	PMS325	ANTI-RADIATION MISSILE EMITTER (ARME)/ SURFACE TGT DEV				
IVM	PMS325	SURFACE TARGET RADAR SIMULATOR (STRS)/ SURFACE TGT DEV				
IVM	PMS430	BATTLE FORCE TACTICAL TRAINING (BFTT) IMPROVEMENT PROGRAM				
IVM	PMS440	MASS MEMORY STORAGE DEVICE (MMSD)/ STANDARD HARDWARE SYS				
			ACAT TOTAL = 27			

\* INDICATES NEW START; HAS NOT OFFICIALLY BEEN DESIGNATED AS AN ACAT PROGRAM

# PEO Carrier ACAT Programs --Today

IC	PMS312	CVN 68 CLASS NUCLEAR AIRCRAFT CARRIER
ID	PMS378	CVX NEXT GENERATION AIRCRAFT CARRIER

ACAT	ID	--	1
ACAT	IC	--	1
ACAT	II	--	0
ACAT	III	--	0
ACAT	IV	--	0
<hr/>			
ACAT TOTAL = 2			



# TEAM CLA ACAT PROGRAMS (pre- 4/98)

ID	PMS 317	LPD 17 AMPHIBIOUS TRANSPORT DOCK SHIP	ACAT	ID	--	3
*ID	PMS 325	AUXILIARY DRY CARGO CARRIER/ ADC(X)	ACAT	IC	--	3
*ID	PMS 378	CVX NEXT GENERATION AIRCRAFT CARRIER	ACAT	II	--	1
IC	PMS 312	CVN 68 CLASS NUCLEAR AIRCRAFT CARRIER	ACAT	III	--	6
IC	PMS 377	LHD 1 AMPHIBIOUS ASSAULT SHIP	ACAT	IV	--	11
IC	PMS 385	STRATEGIC SEALIFT				
II	PMS 377	LSD 41 (CV) CARGO VARIANT				
III	PMS 325	AGOR 24 OCEANOGRAPHIC RESEARCH VESSEL				
III	PMS 325	PC 1 CYCLONE CLASS COASTAL PATROL SHIP (FORMERLY PBC PCC)				
III	PMS 325	T-AGS 60 CLASS OCEANOGRAPHIC SURVEY SHIP				
III	PMS 373	COAST GUARD POLAR ICEBREAKER				
III	PMS 377	COMMAND & CONTROL SYSTEM FOR AN/KSQ-1				
III	PMS 385	MARITIME PREPOSITIONING FORCE (ENHANCED)/ MPF(E)				
IVT	SEA 00C3	SUBMARINE RESCUE DIVING AND RECOMPRESSION SYSTEM (SRDRS)				
IVT	SEA 91W	COMPUTER AIDED DEAD RECKONING TRACER (CADRT)				
IVT	SEA 91W1	AN/WSN-7 RING LASER GYROSCOPE NAVIGATOR (RLGN)				
IVT	SEA 91W13	AN/WQN-2 DOPPLER SONAR VELOCITY LOG (DSVL)				
IVT	SEA 91W5	ADVANCED DISPLAY SYSTEM (ADS) /AN/UYQ-70(V)				
IVM	PMS 325	SPECIAL OPERATION FORCES LASER MARKER (SOFLAM) AN/PEQ-1				
IVM	PMS 325	SURFACE TARGET RADAR SIMULATOR (STRS)/ SURFACE TGT DEV				
IVM	PMS 325	ANTI-RADIATION MISSILE EMITTER (ARME)/ SURFACE TGT DEV				
IVM	PMS 430	BATTLE FORCE TACTICAL TRAINING (BFTT) IMPROVEMENT PROGRAM				
IVM	PMS325	BARRACKS CRAFT {APL(SMALL)}				
IVM	SEA 91W5	MASS MEMORY STORAGE DEVICE (MMSD)/ STANDARD HARDWARE SYSTEM				

ACAT	ID	--	3
ACAT	IC	--	3
ACAT	II	--	1
ACAT	III	--	6
ACAT	IV	--	11
ACAT TOTAL = 24			

\* INDICATES NEW START; HAS NOT OFFICIALLY BEEN DESIGNATED AS AN ACAT PROGRAM

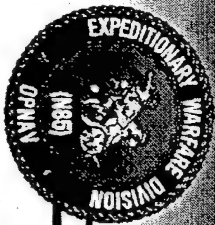


# Amphibious Warfare Branch (N853)

## Brief to the NDIA 3rd Annual Expeditionary Warfare Conference



**CAPT John Strott**

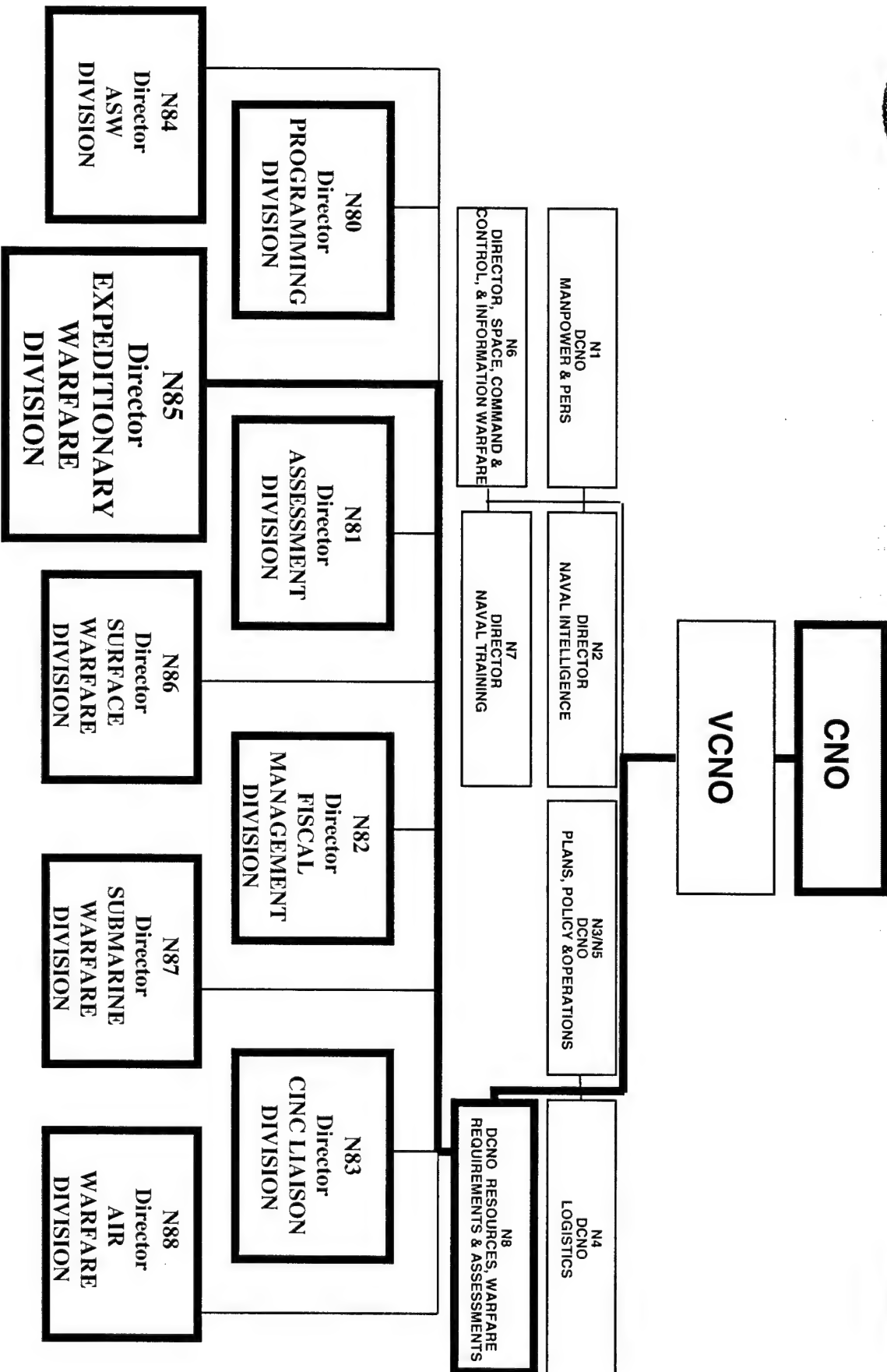


# Outline

- ◆ The People
- ◆ The Mission
- ◆ Major Programs
  - ❖ Amphibious Lift
  - ❖ LPD-17
  - ❖ LHA Replacement
  - ❖ LCAC SLEP
  - ❖ Unmanned Aerial Vehicles (UAVs)
  - ❖ Naval Surface Fire Support (NSFS)
  - ❖ Maritime Prepositioned Force (MPF)
  - ❖ Amphibious Warfare C4I
  - ❖ Amphibious Warfare Plan



# CNO / N8 / N85 Line Chart





## N853 Mission

### ◆ SPONSOR FOR:

- ❖ LHA/LHD/LPD/LSD-36/41/49
- ❖ New Construction (LPD-17/LHD-6 & 7/LSD-52)
- ❖ Naval Support Element (ACU/BMU/PHIBCB)
- ❖ LCAC
- ❖ Pioneer UAV
- ❖ UAV Tactical Control System
- ❖ Vertical Take-off and Landing Tactical UAV (VTUAV)
- ❖ Civil Engineering Support Equipment
- ❖ Amphibious Assault Direction System (AN/KSQ-1)
- ❖ Maritime Prepositioned Force (MPF)



## Amphibious Ship Force Structure

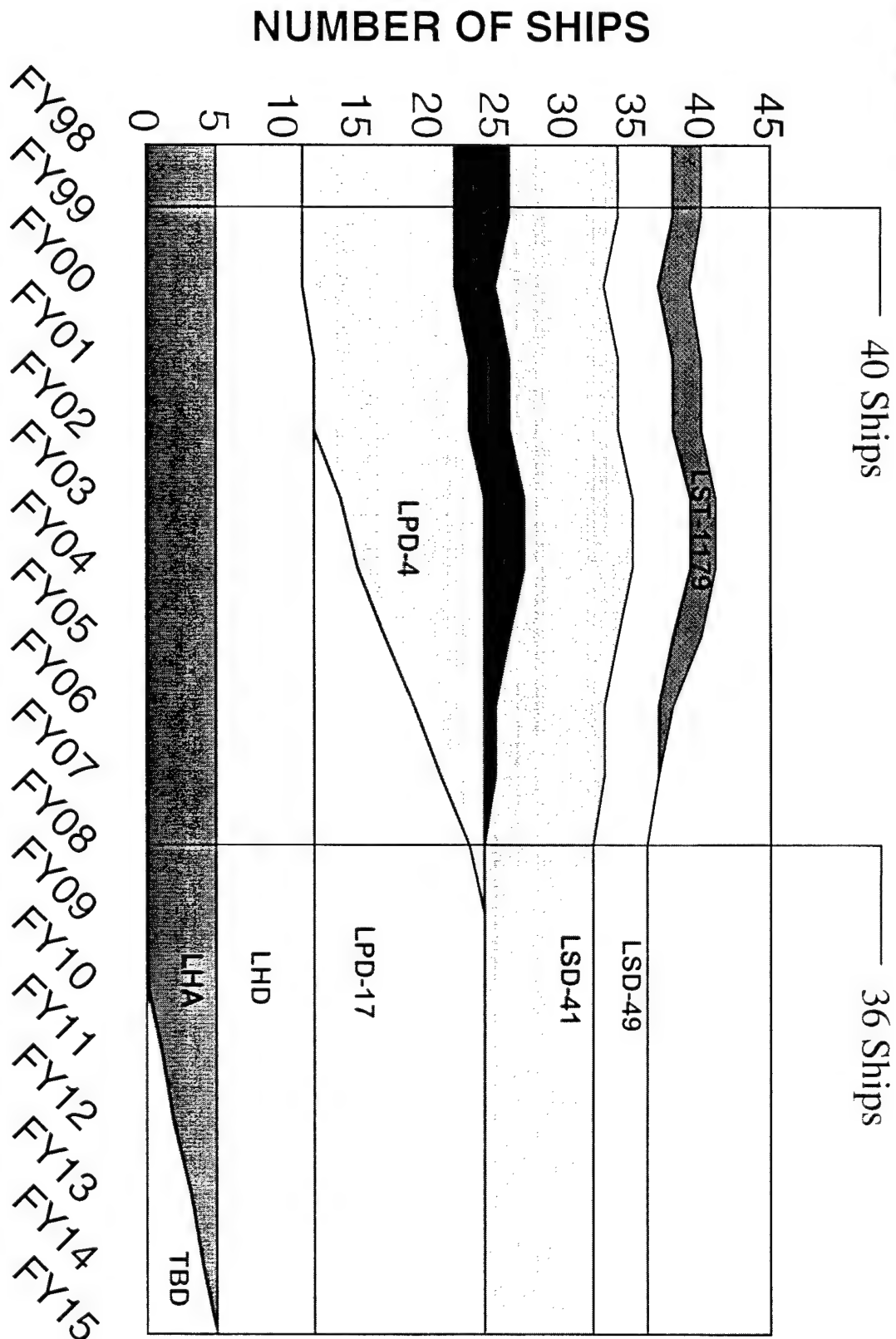
... evolving to 36 ships (12 three-ship ARGs)

- ◆ Requirement (per '90 DoN lift study & DPG):
  - ❖ 3.0 MEB equivalents Amphibious Lift fiscally constrained to 2.5 MEB
  - ❖ 12 ARGs ... translates into:
    - ◆ 12 LHA / LHD
      - LHD 6 delivered May 98, LHD 7 delivers Dec 00
    - ◆ 12 LPD
      - 11 LPD 4s to be replaced by 12 LPD 17s 2003 - 2009
    - ◆ 12 LSD
      - 8/4 LSD 41s / 49s delivered 1985 - 1998
      - LSD 52 Delivered Feb 1998





# Amphibious Ship Force Structure



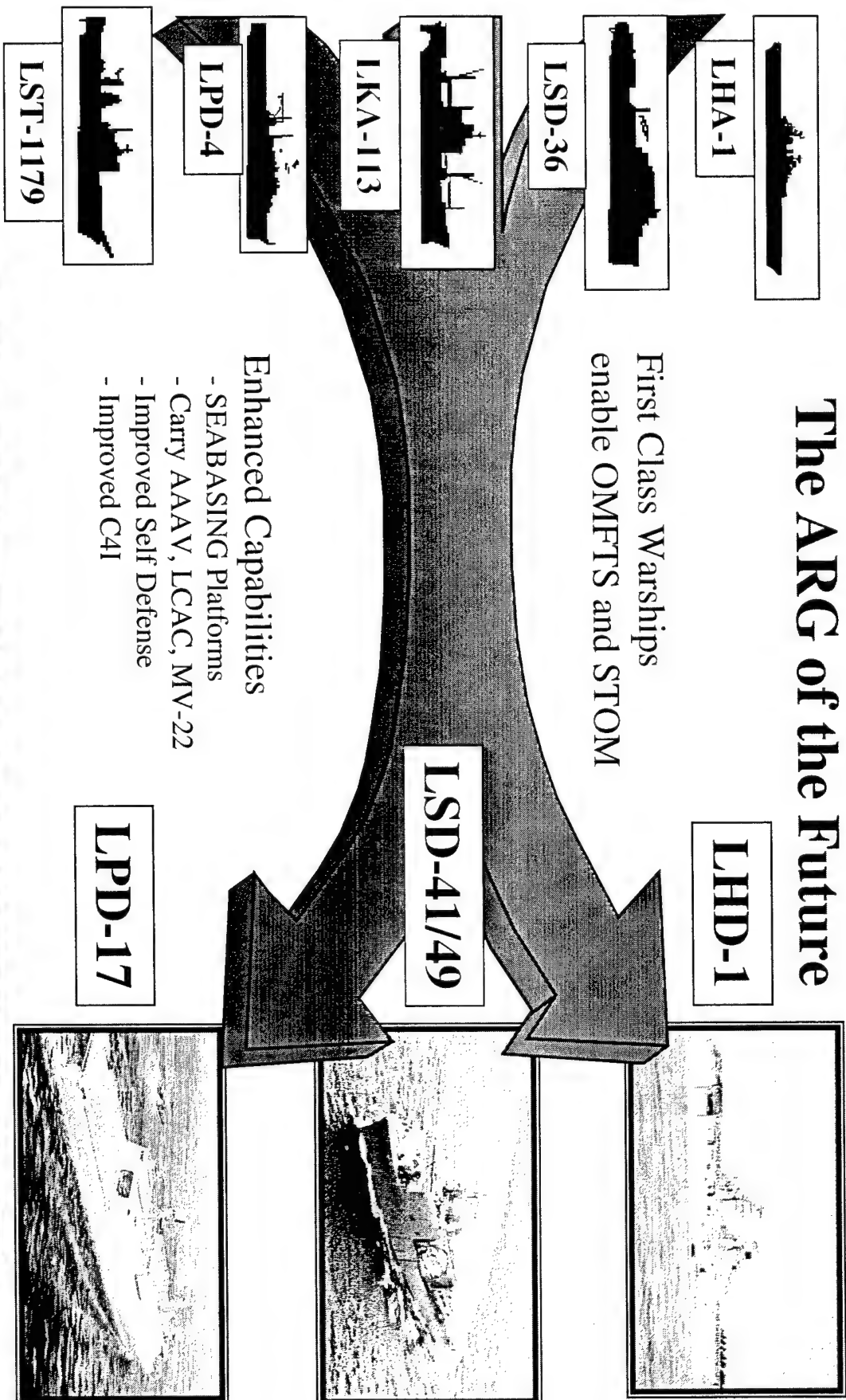


# Amphibious Fleet Evolution

## The ARG of the Future

First Class Warships  
enable OMFTS and STOM

Enhanced Capabilities  
- SEABASING Platforms  
- Carry AAVV, LCAC, MV-22  
- Improved Self Defense  
- Improved C4I



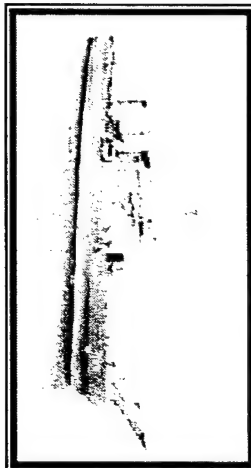


# LPD 17's Role in the New Fleet

## LST 1179 CLASS

AVG. AGE NOW: 27 YRS

NRF PAC - 10 NRF LANT - 10

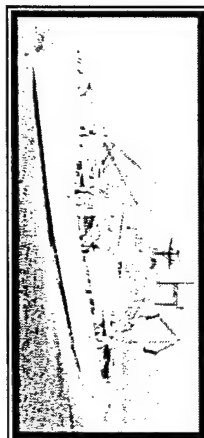


180 DAY  
ROS

## LKA 113 CLASS

RETIREMENT AGE: 25 YRS

5

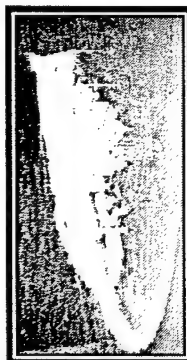


180 DAY  
ROS

## LSD 36 CLASS

AVG. AGE NOW: 27 YRS

5

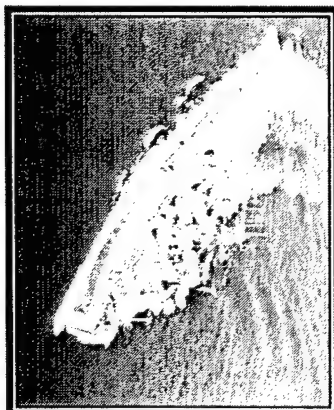


FY 98 - 08

## LPD 4 CLASS

AVG. AGE NOW: 30 YRS

11



FY 03 - 09

SCHEDULE  
D E C E M

TOTAL CREW: 13,000

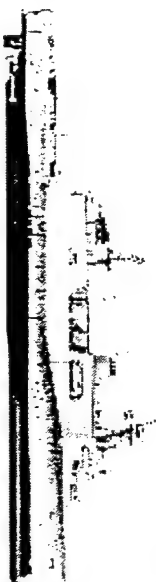
TOTAL TONNAGE: 525,000 LTONS

## LPD 17 CLASS

## 12 Ships Replacing 41

TOTAL CREW: 4,356

TOTAL TONNAGE: 300,000 LTONS





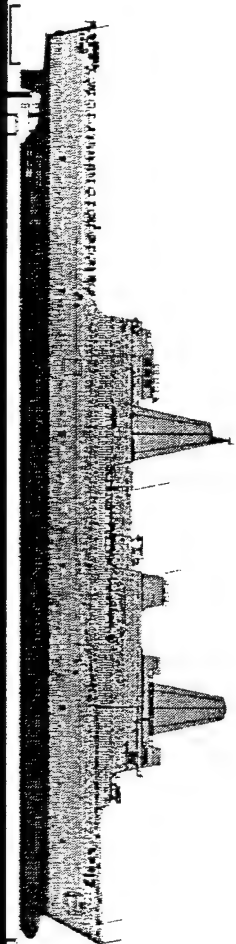
# LPD 17 is...

## GENERAL CHARACTERISTICS

LENGTH (LOA)	208.4 M (684 FT)
BEAM (MAX)	31.9 M (105 FT)
DRAFT	7.0 M (23.0 FT)
DISPLACEMENT (FLD)	25.3K MT (24.9K LT)
PROPULSION	4 MED SPEED DIESEL
SHAFT POWER	40K HP
SUSTAINED SPEED	22+ knots

## MISSION CHARACTERISTICS

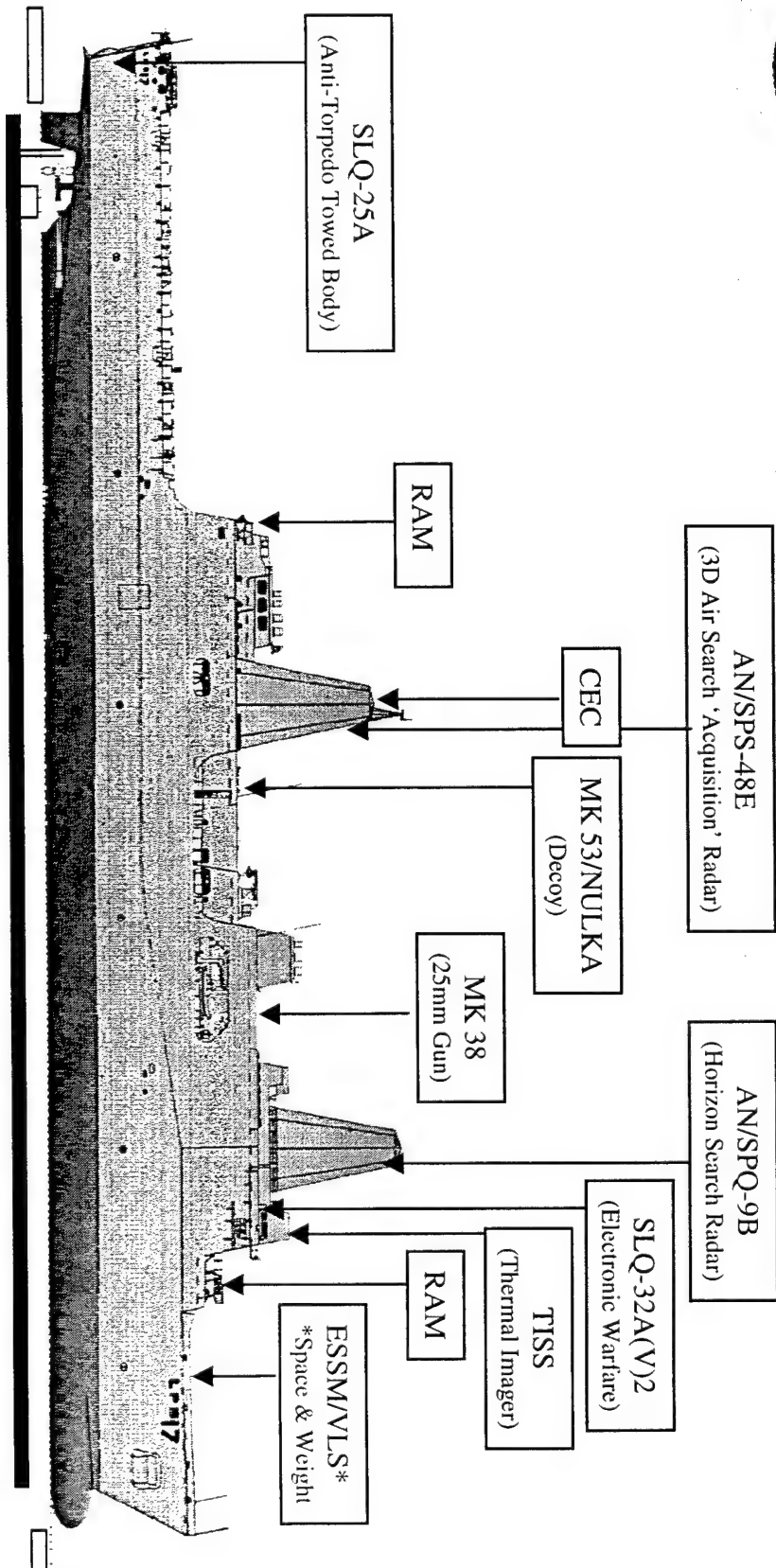
VEHICLE AREA	2.32K M <sup>2</sup> (25K FT <sup>2</sup> )
CARGO VOLUME	1007 M <sup>3</sup> (36K FT <sup>3</sup> )
TROOPS	720
LCAC	2
AVIATION- LAND	4-CH46, 2-CH53E or 2 MV22
HANGAR	2-CH46, 1-CH53 or 1-MV 22
MEDICAL	SECONDARY CRTS (24 BEDS/2 ORs plus overflow)



Schedule FY	96	97	98	99	00	01	02	03	04	05	06	07	08	09	Total
Award	1	0	0	1	2	2	2	2							12
Delivery								2	1	2	2	2	2	1	12



# Combat Systems and Survivability



- Low Radar Cross Section
- Collective Protection System (4 Zones)
  - CBR (Chemical, Biological, Radiological) survivability
- Anti-Whipping Structure
  - Mine/Torpedo survivability
- Blast Hardened Bulkheads
- Shock Hardening

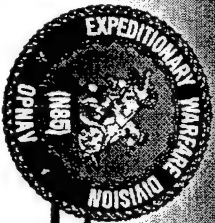




# LPD 17 Combat Systems History

- ◆ FY 1994 Appropriations Act
  - ❖ Include Cooperative Engagement Capability (CEC)
  - ❖ "...self defense... against advanced sea-skimming anti-ship cruise missiles ... no less than any other Navy ship
  - ❖ Addition of ESSM/VLS (space and weight for first 2 ships)
- ◆ FY 1995 Appropriations Act
  - ❖ Directed CEC in baseline
  - ❖ AEGIS not required
- ◆ Navy PR 99 Review
  - ❖ RAM/NULKA/SLQ-32 sufficient to meet CNO capstone requirements against validated threats
  - ❖ ESSM/VLS space and weight for all ships
- ◆ FY 1999 Appropriations Conference Report
  - ❖ Conduct study of combat system and provide report





## LHA: Mid-Life and Beyond 2011

- ◆ LHA MID-LIFE -- IN ORDER TO REACH 35yr LIFE
  - ❖ INSURV Reported Reduced Readiness
    - ◆ Design Deficiencies Identified
    - ◆ Robust Maintenance/ShipAlt Program In Place
- ◆ LHA REPLACEMENT (BEYOND 2011)
  - ❖ LHAs Reach Expected Service Life (35 Years) in FY11-15
  - ❖ Options:
    - ◆ LHA-1 Class Service Life Extension
    - ◆ LHD-8 Modified Repeat Design
    - ◆ LH(X) New Design
  - ❖ CNA Study (Oct 98 - Jun 99) will support decision on best option

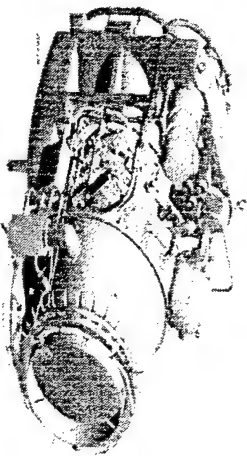


# LCAC 91 Final Production Craft

## First Article SLEP Craft

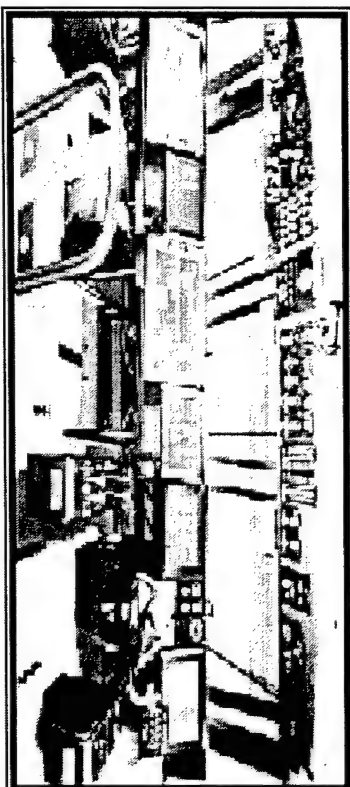
### C4N SUITE

- ◆ Improved Navigation Precision and Displays
- ◆ Increased Reliability and Supportability
- ◆ 100MB Fiber Optic Network for PC Based COTS Equipment and Upgrades
- ◆ MIL-STD-1553 BUS for Military Equipment
- ◆ Supports OMFTS/STOM



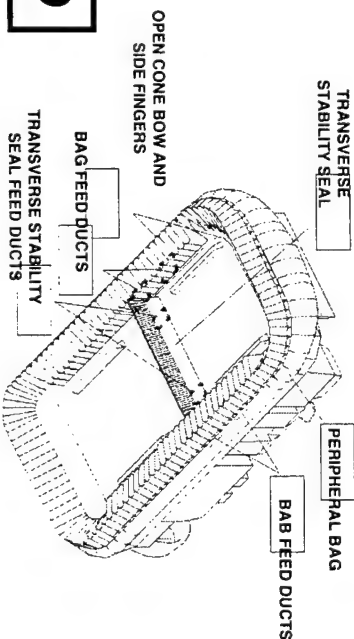
### TM&LS ADVANCED SKIRT

- ◆ Reduced skirt life-cycle operating costs
- ◆ Reduced fuel consumption



### ETFE40B ENHANCED ENGINES

- ◆ New Power Plant
- ◆ Projected 20% horsepower increase
- ◆ Reduced engine life-cycle costs



### CRAFT DELIVERY - FY99



# Landing Craft Air-Cushion Service Life Extension Program

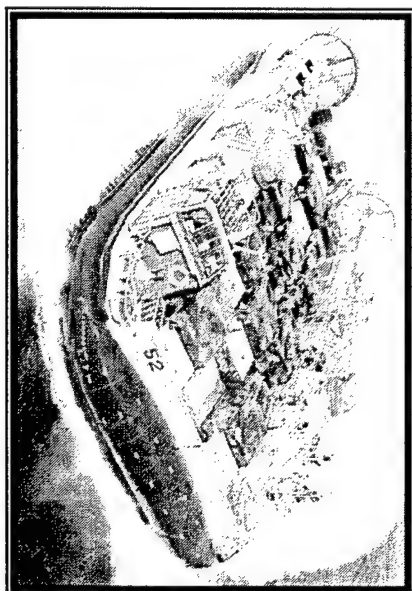
## EXTENDS LCAC LIFE TO 30 YEARS

### Phase I: C4N Upgrade, Corrosion Abatement

- ◆ High speed fiber optic data bus for flexible use of COTS equipment
- ◆ Next generation industry products readily adaptable
- ◆ MIL-STD-1553 BUS for military equipment

### Phase II: New Buoyancy Box, C4N Upgrade

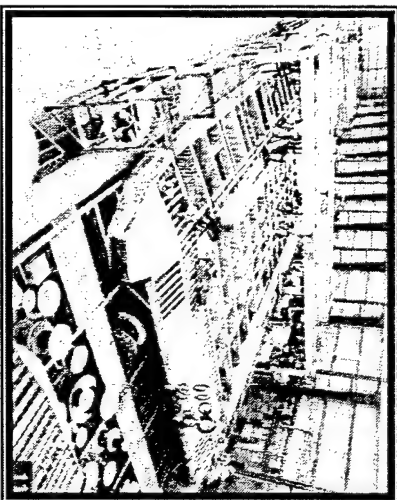
- ◆ Next generation skirt system
- ◆ Reuses many existing mechanical systems
  - ◆ Industry refurbishment of many components
  - ◆ Reduces cost of SLEP mechanical systems



## PRODUCTION 1999 - 2016

\* \$16M FY 99 CONGRESSIONAL PLUS UP \*

\* 74 craft currently programmed for SLEP \*



## ETF40B ENHANCED ENGINES

- Provides ability to conduct high speed lift of M1A1 tank in 100 degree temperatures
- Improves engine life thus reducing life-cycle costs

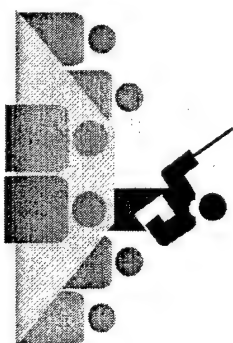


# Naval Unmanned Aerial Vehicles

## Requirements Priorities and Program Goals

### ◆ Naval Tactical UAV

- ❖ Sustain Pioneer and Naval UAV Infrastructure
- ❖ Validate VTOL ORD (JRROC)
- ❖ Execute VTOL Acquisition Plan
- ❖ Integrate TCS Capabilities



NAVAL UAV ESG  
Program Priorities

### ◆ Naval Medium Altitude Endurance (MAE) UAV Capability

- ❖ Predator Air Vehicle Positional Control and Data Receipt via TCS Interoperability
- ❖ Study Organic Naval MAE Capability

### ◆ High Altitude Endurance (HAE) UAV Capability

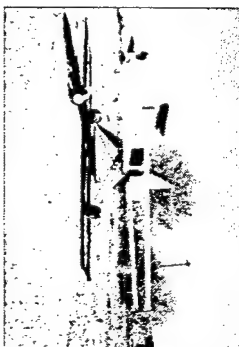
- ❖ Naval Ability to Task and Receive Data via TCS



# Naval Tactical UAV Transition

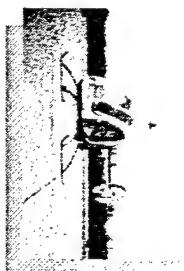
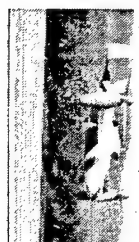
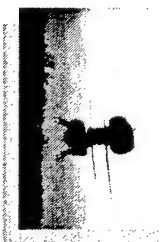
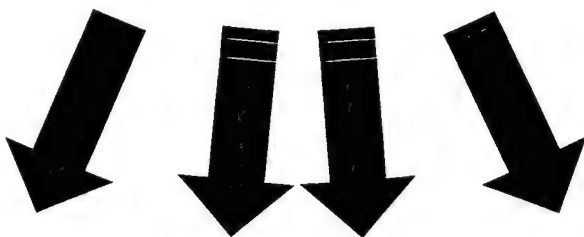
## PIONEER

9 systems deployed in the Navy and USMC  
- 6 Navy, 2 USMC, 1 training  
Provides real-time imagery to tactical commanders  
Operational through FY03



## OUTRIDER

Expected Joint Tactical UAV  
- Pioneer Replacement  
MUA proved unsuitable for Navy  
JROC Approved Separate Air Vehicle



Other...

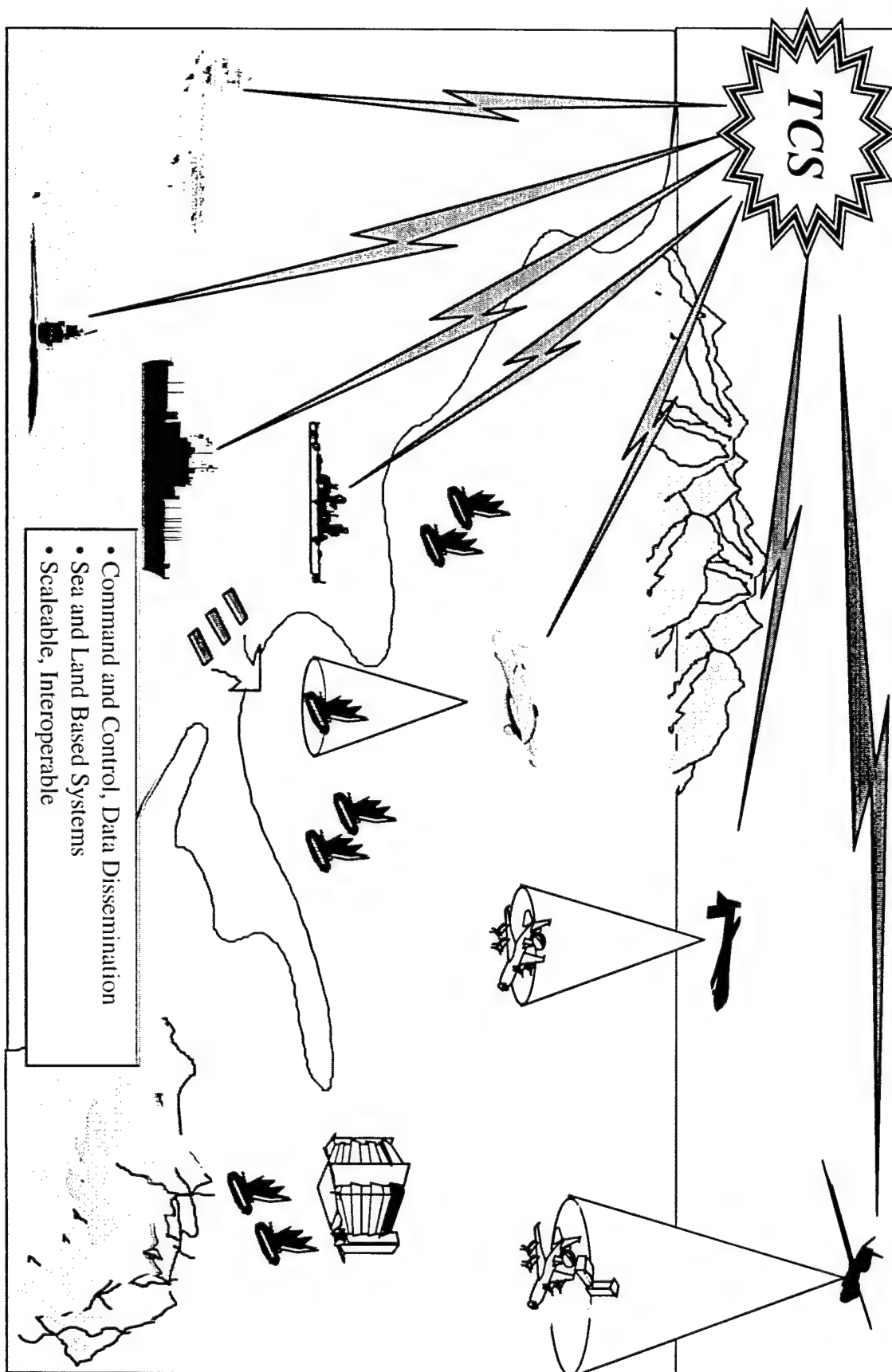
## VTOL

Navy & USMC Future  
ORD under Staffing  
Phase II Demo in FY99



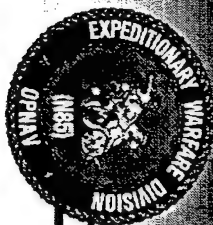


# Naval UAV Employment Concept









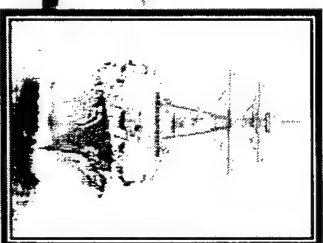
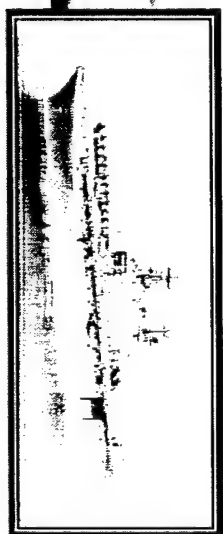
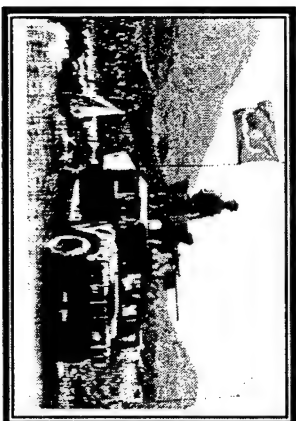
# NSIS... A Combined Effort OPNAV - USMC

Title 10 of Defense Appr. Act 1993:  
The principal duty of the Dir. for Expeditionary Warfare shall be to supervise the performance of all staff responsibilities of the CNO regarding Expeditionary Warfare, including responsibilities regarding amphib lift, mine warfare, naval fire support, & other missions essential to supporting Expeditionary warfare.

N85

N86

HQMC; PRO/PO&E  
MCCDC; GROUND REQ



CUSTOMER

- USMC
- USA

REQUIREMENTS

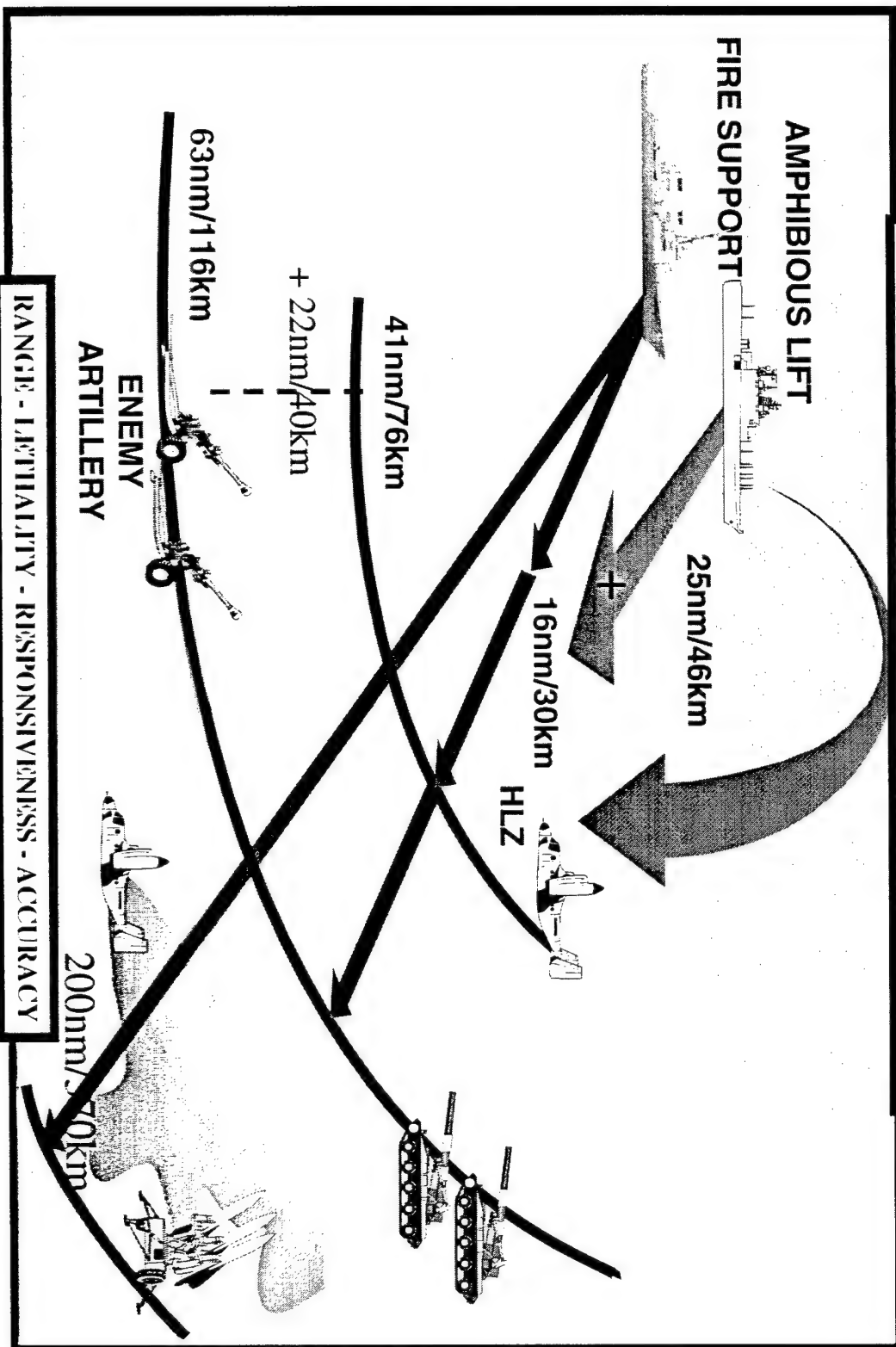
PROGRAMS

- ERGM
- LAM
- AGS
- DD21
- C4I INTG.



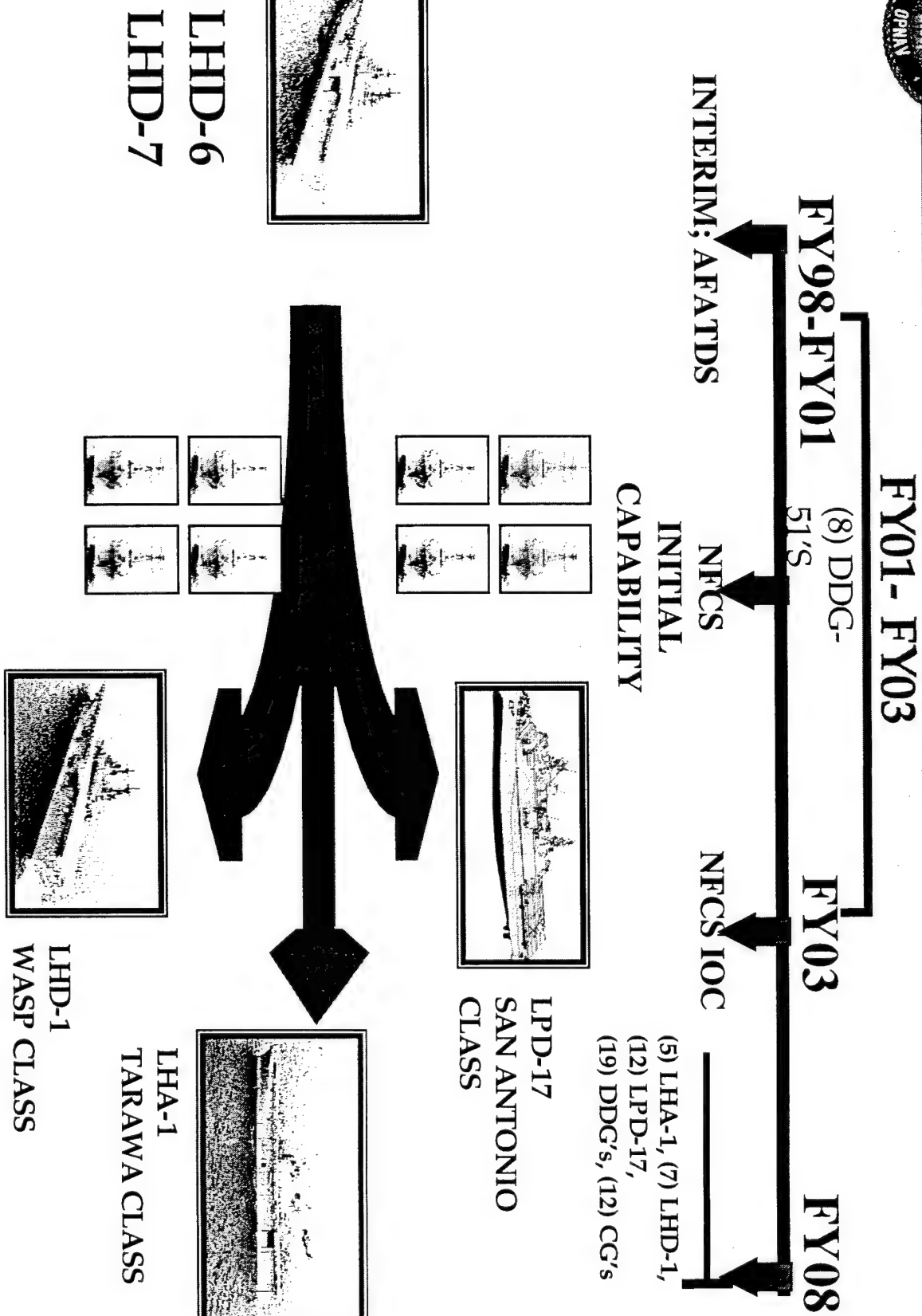
# NSFS Requirements in Support of OMFITS

COMMAND AND CONTROL - TARGET ACQ - WEAPONS SYSTEMS



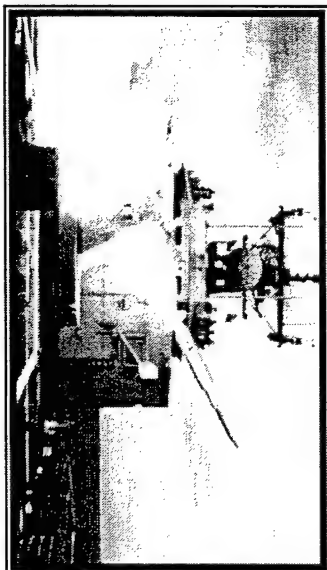
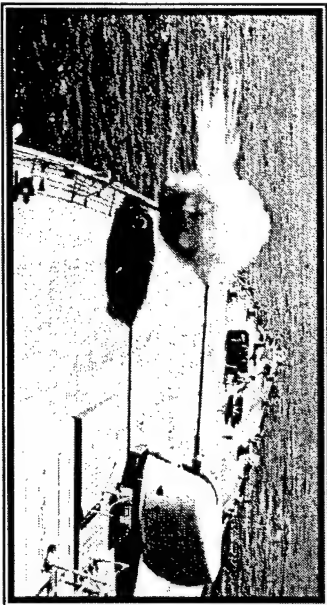


# Current Plan





## What is next for NSFS? Where Can Industry Help?

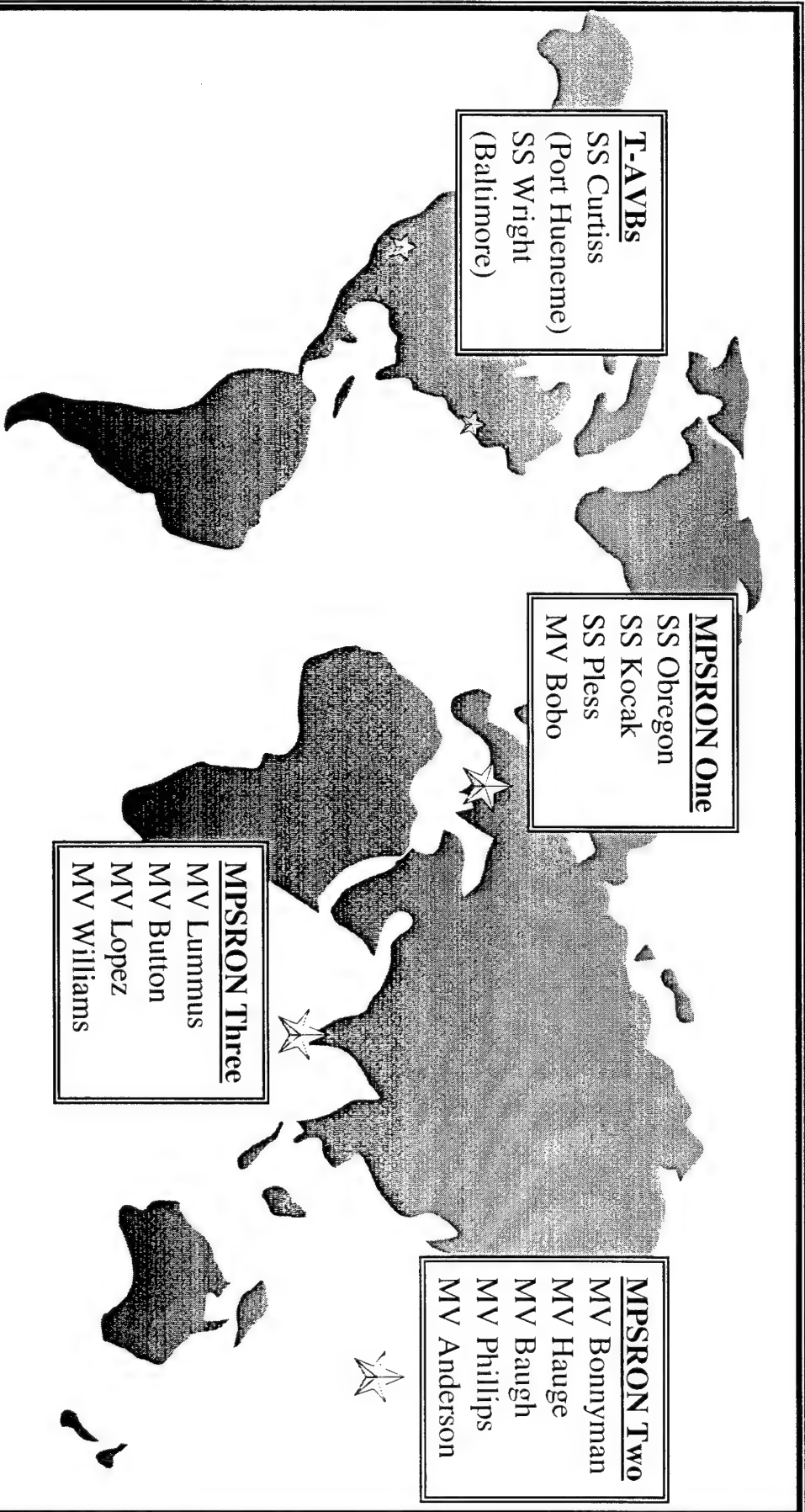


- ◆ Rapid, real-time airspace deconfliction between bullet and aircraft. Autonomous, fire and forget. Warning system... On plane? On bullet? On both?
- ◆ Seabased Counter-Battery detection capability out to 70nm.
- ◆ Non-lethal gun and missile delivered munitions.
- ◆ Indirect fires in the "Urban Canyon."
- ◆ Volume of fire - inexpensive, less precise munitions.





# MPE Sites Give Global Reach

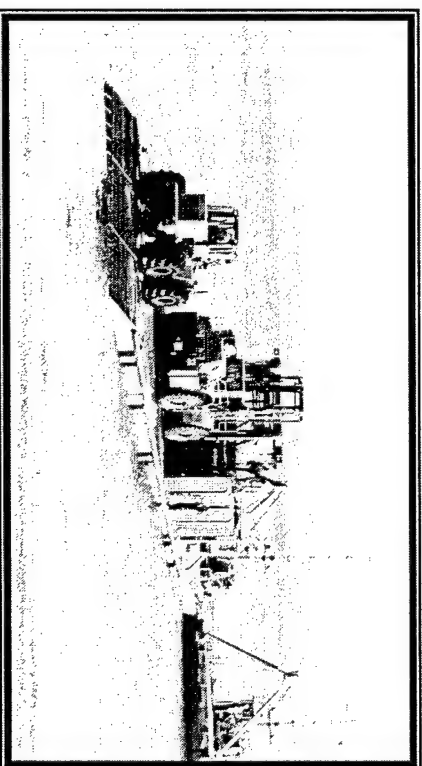
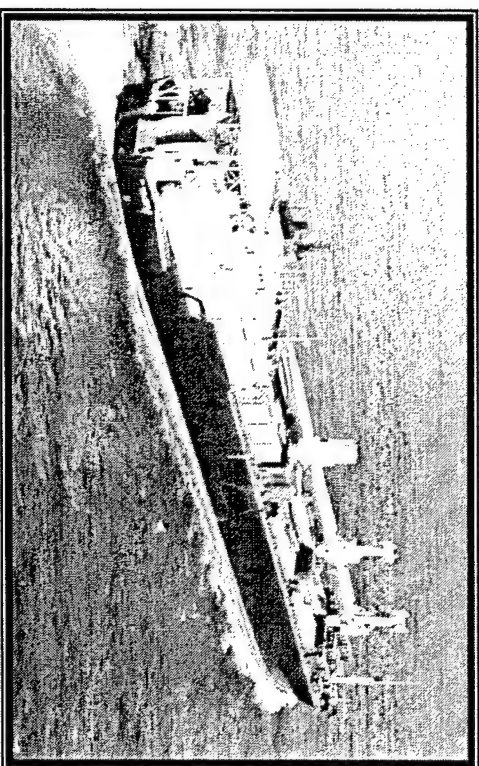






# Maritime Prepositioning Force (MPF)

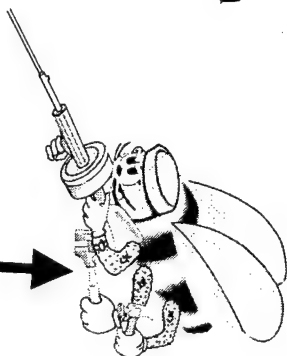
- ◆ MPF
  - ❖ Proven operational capabilities; Logistics support for MAGTF; Independent download capability
- ◆ MPF Enhancement (MPF-E)
  - ❖ Increased capacity for immediate needs of warfighting CINCs, Independent Medical support, Ability to support Strategic Air, JTF Interface, Heavy Engineering Support capability.
- ◆ MPF 2010/Future
  - ❖ Arrival and Assembly at Sea
  - ❖ Less Footprint Ashore
  - ❖ Seabasing
  - ❖ ATF Integration
  - ❖ Force Closure
  - ❖ Indefinite Sustainment





# MPF(E)

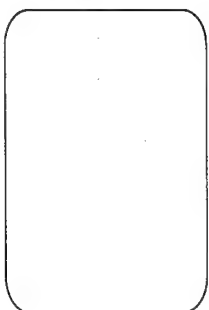
- ◆ Program approved by Congress in FY95
- ◆ Intent: Convert 3 Commercial Roll-On/ Roll-Off Ships to MPF ships
- ◆ Additional capabilities to each MPSRON:
  - ❖ Naval Mobile Construction Battalion(NMCB)
  - ❖ 500 Bed Fleet Hospital
  - ❖ 5000 Foot Expeditionary Airfield (EAF)
  - ❖ Table of Equipment (T/E) Restoration
- ◆ Currently two ships under conversion; Reviewing 3rd ship acquisition strategy



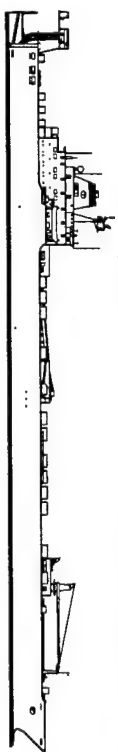
**COMBAT  
CONSTRUCTION  
BATTALION**



**EXPEDITIONARY  
AIRFIELD**



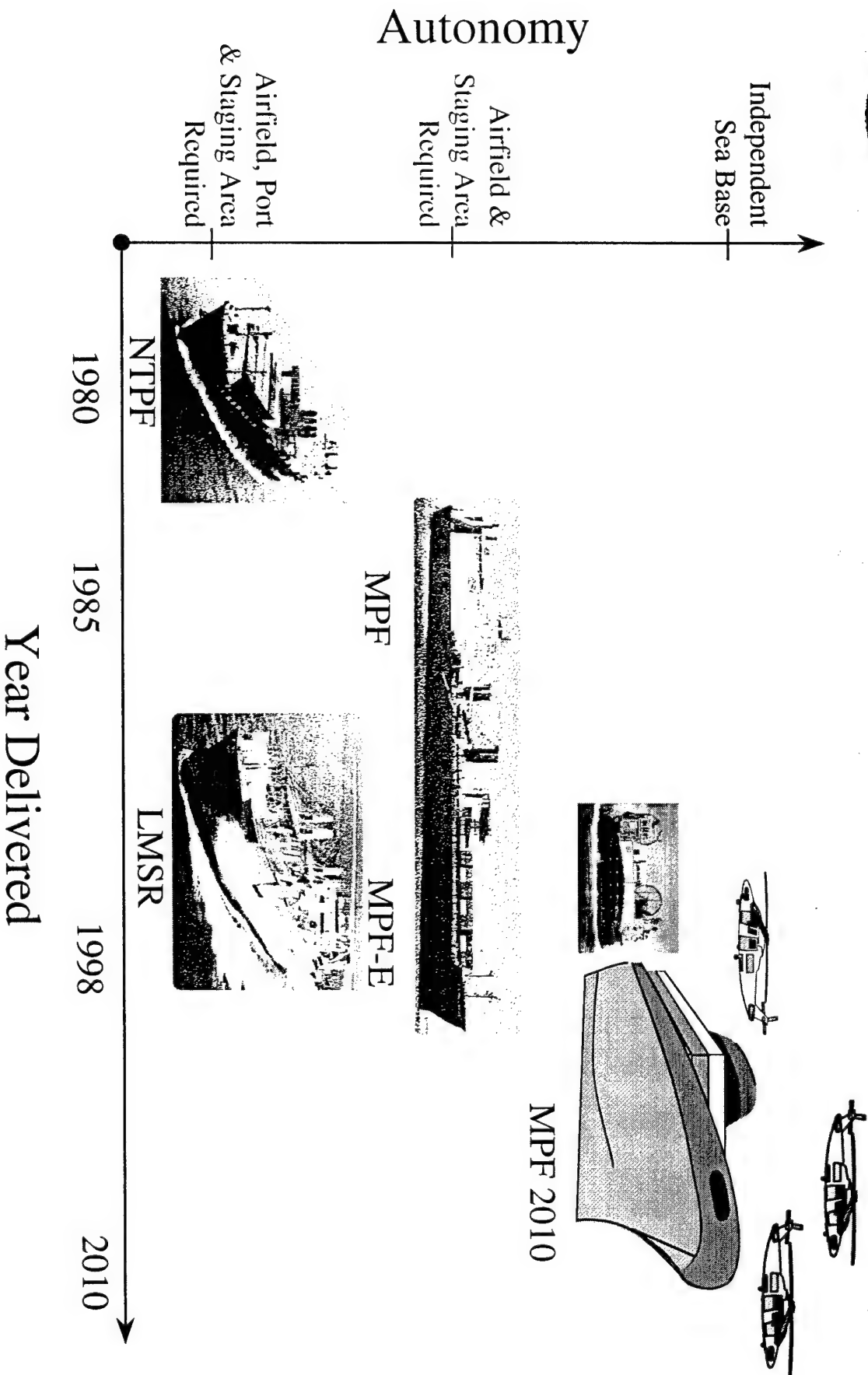
**FLEET HOSPITAL**



**MPF (E)**



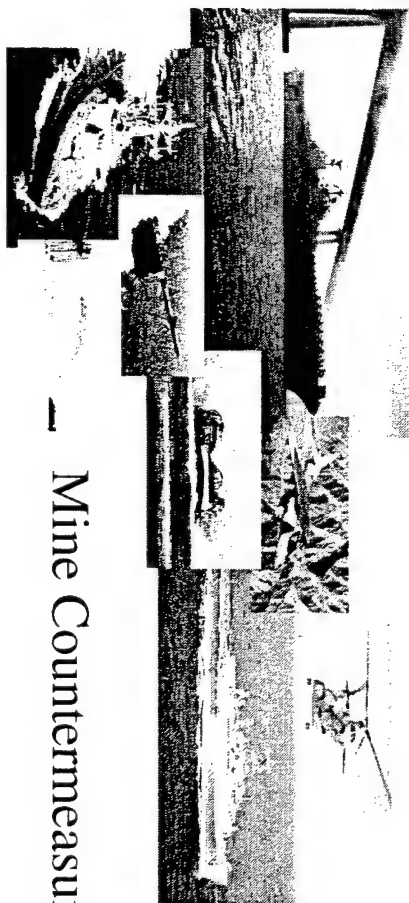
# MPF Future Capability Growth





# Sea Based C2 Requirements

Operational & Tactical Control  
...from the Sea

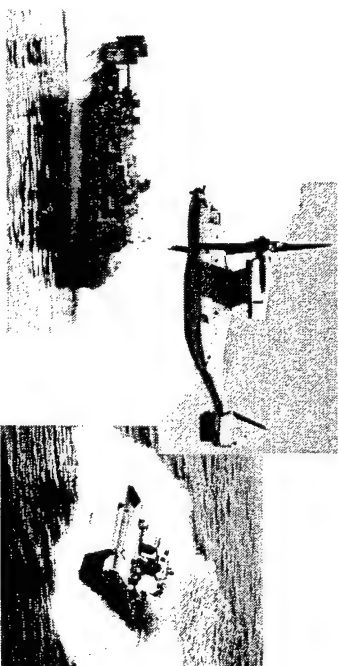


Integrated C2

- National
- Joint

Mine Countermeasures

MEU to MEF  
Level  
Amphibious  
Operations



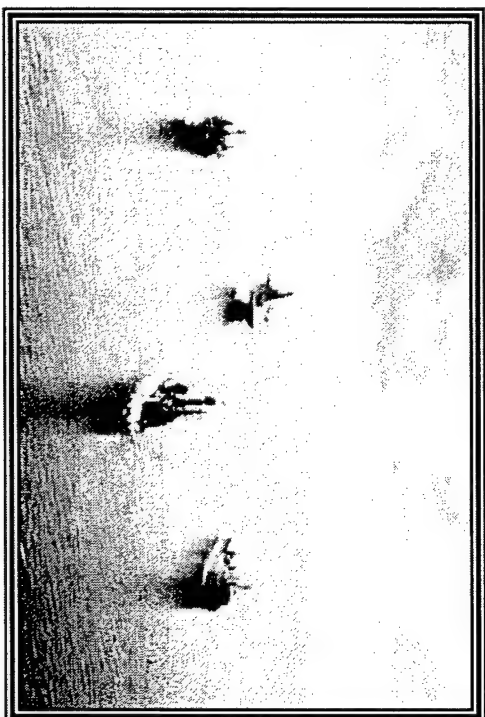
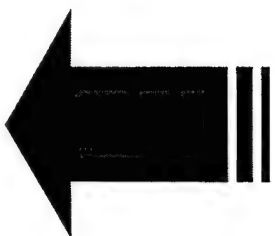
Ship to Objective Maneuver



# Amphibious Fleet

## Expeditionary Forces C4ISR Integration Strategy

- ◆ Unity of Command and Control Systems
- ◆ Mutually Supporting Networks
- ◆ Distance Independence
- ◆ Cooperative Management



- ◆ Digital Wideband Transmission System (DWTS)
- ◆ Commercial Wideband SatCom (Challenge Athena)
- ◆ Dual SHF and QUAD-DAMA
- ◆ KSQ-1 with EPLRS Backbone

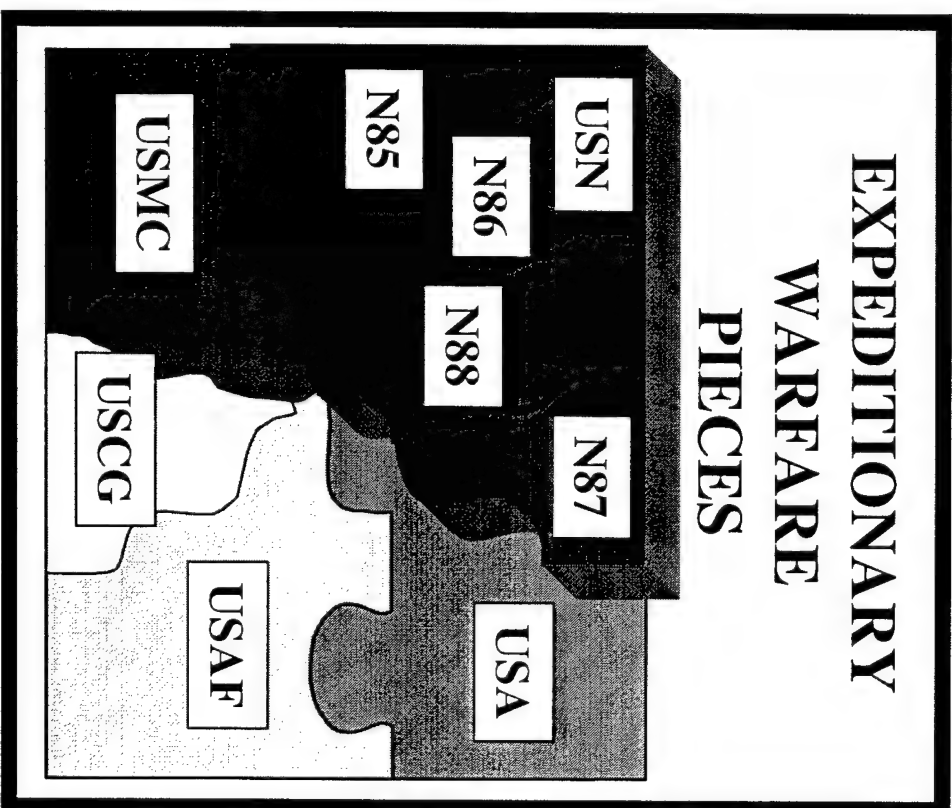




# Amphibious Warfare Plan

## Mission Statement

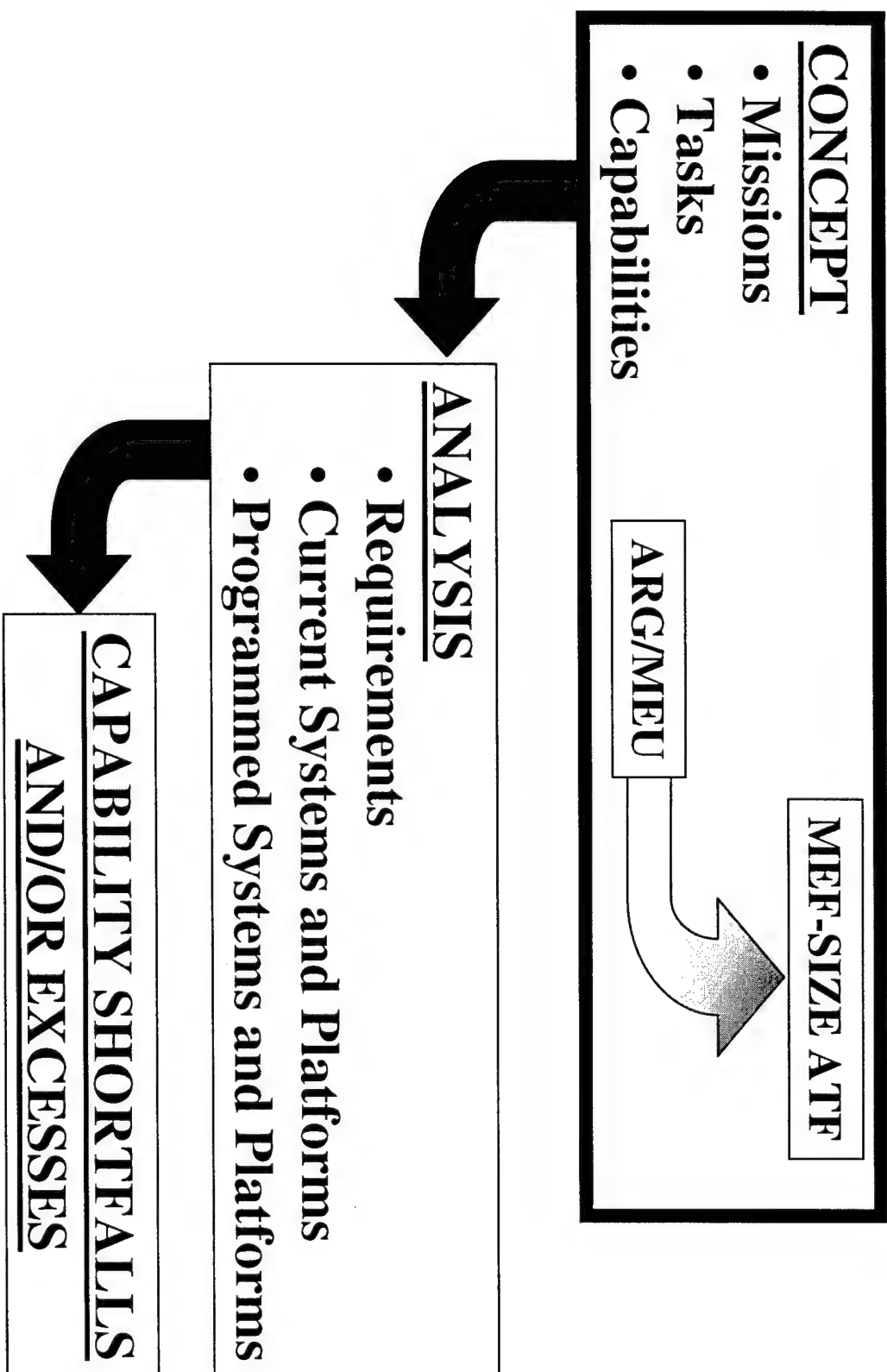
- ◆ TO DEVELOP A FLEET SUPPORTED AMPHIBIOUS WARFARE PLAN THAT WILL GUIDE THE DEVELOPMENT OF NAVY AMPHIBIOUS WARFARE CAPABILITIES, AS A SUBSET OF EXPEDITIONARY WARFARE, FOR THE NAVY-MARINE CORPS TEAM INTO THE 21st CENTURY





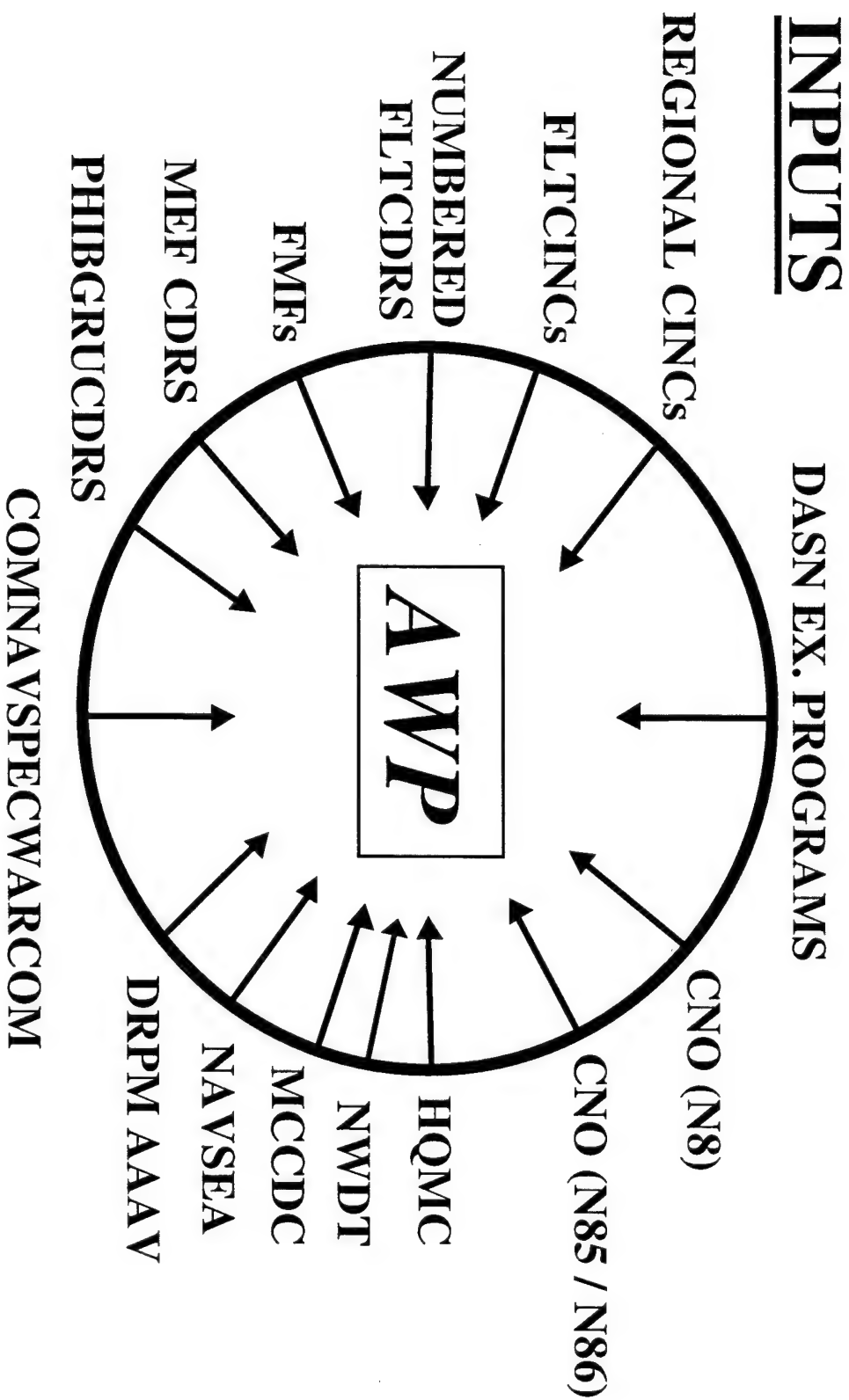


## Concept-Based Amphibious Warfare Requirements





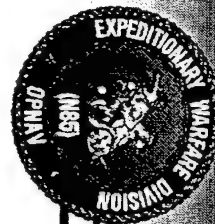
# Methodology





## The Amphibious Warfare Plan

- ◆ AN OVERALL PLAN THAT WILL
  - ❖ Provide a roadmap for amphibious developmental efforts and a framework within which amphibious warfare capabilities will be developed.
  - ❖ Provide visibility for amphibious concepts, requirements, capabilities, programs, and shortfalls
  - ❖ Facilitate coordinated, and cost-effective program efforts in the amphibious community



## Back-Up Slides





# Naval UAV

## Executive Steering Group

### Executive Steering Group Membership

revised 8/21/98

#### Executive Committee

- ◆ N85 (chair)
- ◆ N86
- ◆ N88
- ◆ HQMC (Aviation)
- ◆ PEO(CU)
- ◆ Deputy CG MCCDC
- ◆ DASN (Air)

#### Advisory Committee

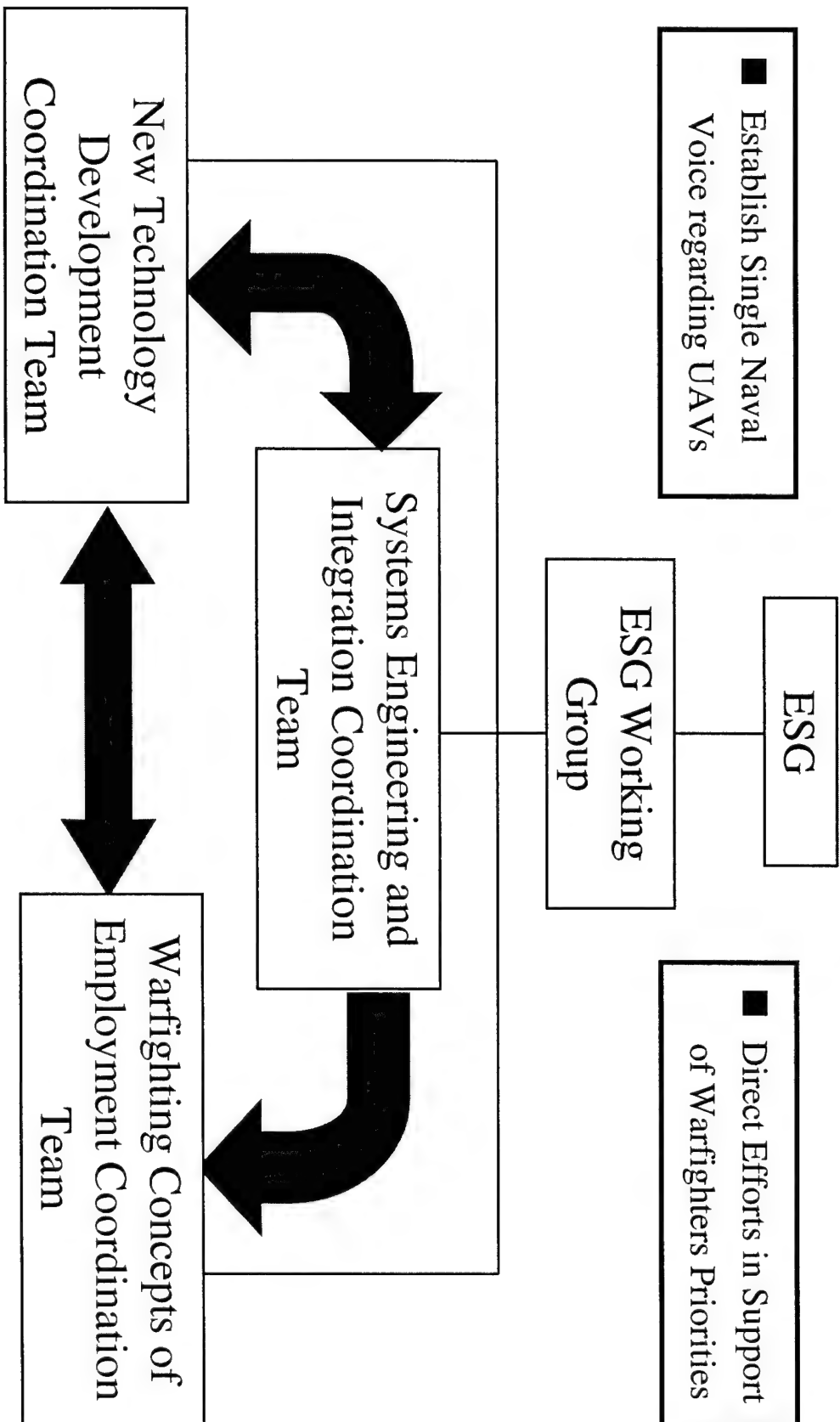
- |         |                   |
|---------|-------------------|
| ◆ N2    | ◆ CNR             |
| ◆ N51   | ◆ HQMC(C4I)       |
| ◆ N6B   | ◆ CG MARCORSYSCOM |
| ◆ N8B   | ◆ HQMC DC/S PP&O  |
| ◆ N83   | ◆ HQMC DC/S P&R   |
| ◆ N87   | ◆ NAVAIR          |
| ◆ NWDC  | ◆ NAVSEA          |
| ◆ NSAWC | ◆ SPAWAR          |



# Naval UAV

## Executive Steering Group

### Organizational Structure

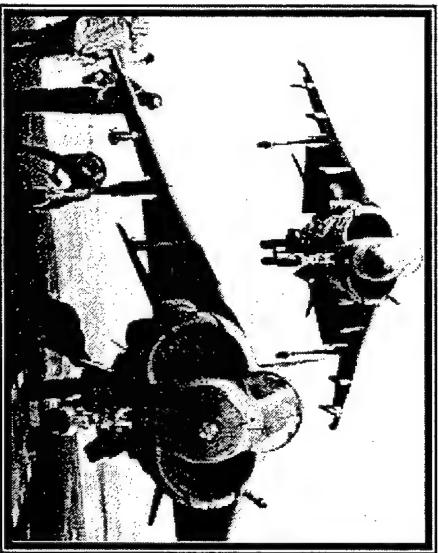




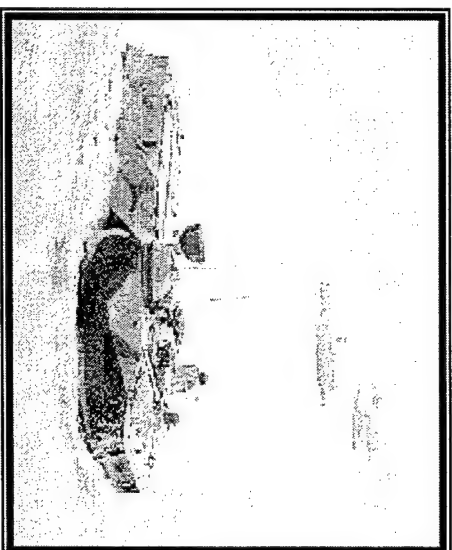


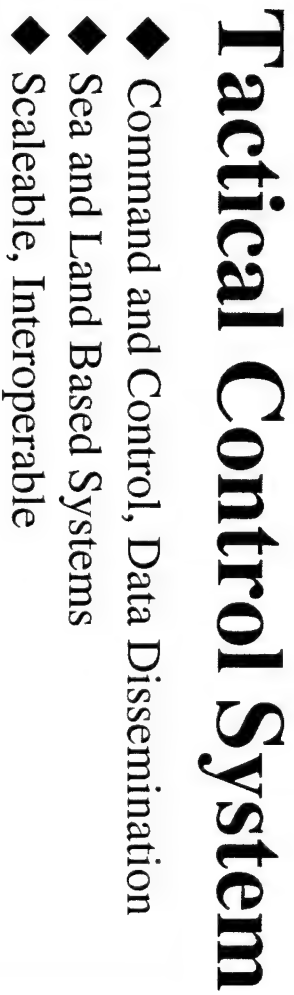
# Naval Expeditionary Warfare

Military operations mounted from the sea, usually on short notice, consisting of forward deployed, or rapidly deployable, self sustaining naval forces tailored to achieve a clearly stated objective.

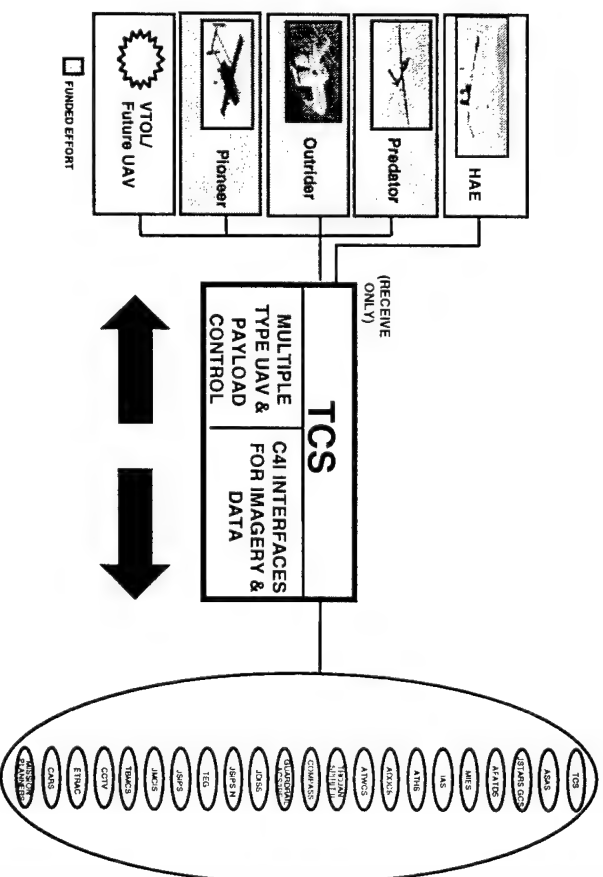


*Equally as Vital to the  
Relevance of the  
Navy  
as it is to the  
Marine Corps !*





- ◆ Provide UAV Control Interoperability
- ◆ Provide Control System Scalability
- ◆ Enable Rapid Target/imagery Dissemination





# **Naval Aviation:**

## ***“Shaping and Dominating the Battlespace... anywhere, anytime.”***

**Rear Admiral Nathman**  
**Director, Air Warfare Division**



# National Military

# Joint Vision



## Strategy

2010

- Strategic agility
- Overseas presence
- Power projection
- Decisive force
- Dominant maneuver
- Precision engagement
- Full dimensional protection
- Focused logistics

*“Naval Expeditionary Forces are tailored to shape and directly influence events for any crisis or conflict... anytime, anywhere.”*



# Current Operational Realities

- *“Where is the closest carrier?”*
  - The first question during any crisis
- *“The only thing that can replace a Carrier Battle Group is another Carrier Battle Group.”*

# **Increasing need for Naval Expeditionary Forces and Naval Aviation**



# Increasing Need for Naval Aviation



- The enabler for Naval Expeditionary Forces
- Sustained power projection
- Precise, lethal and coherent
- Complements the full spectrum of operations conducted with Naval Expeditionary Forces
  - Air presence
  - Battle space shaping
  - CAS
  - Airborne Mine Countermeasures
  - Surveillance



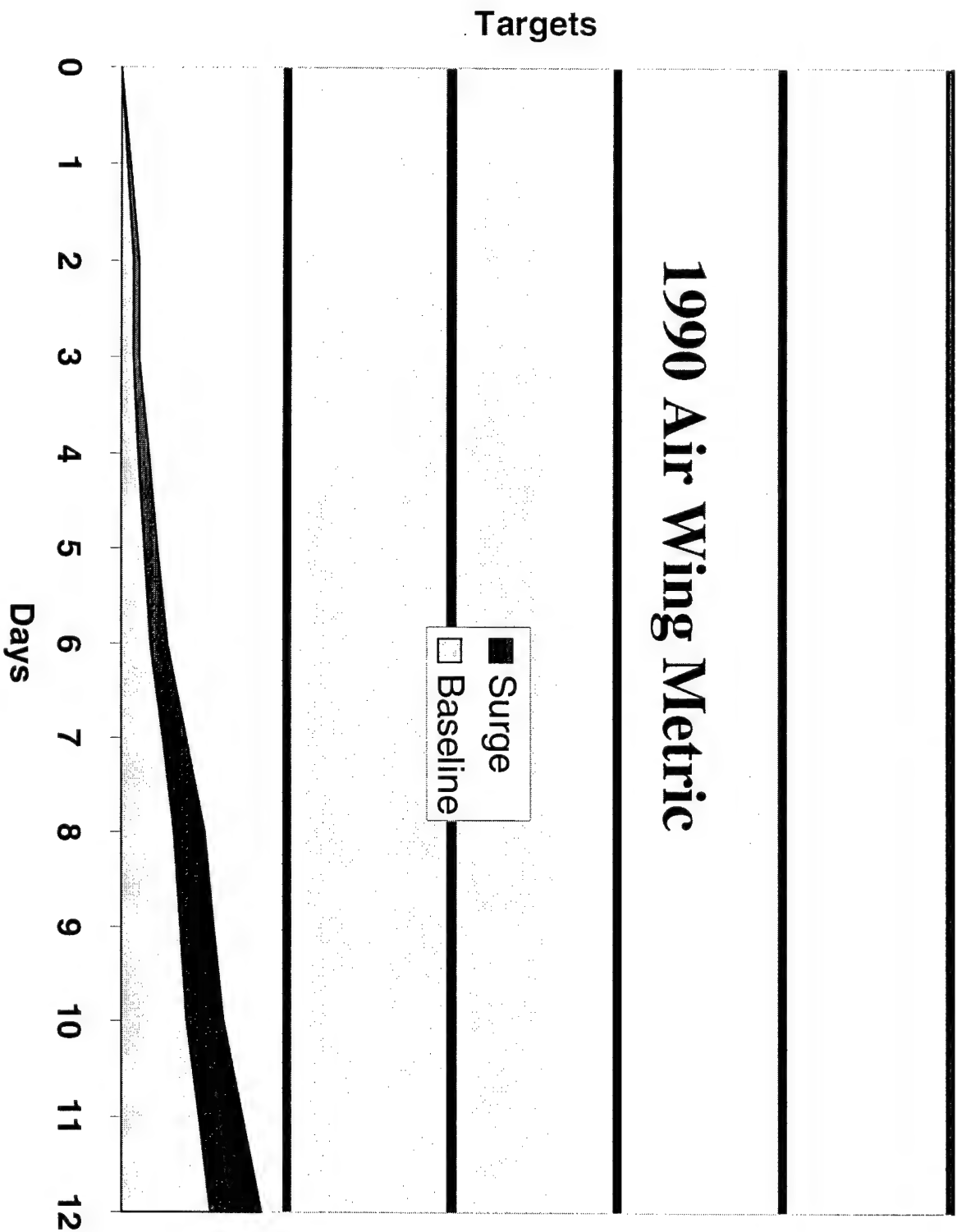


# Vision

- Naval Aviation will lead and enable two revolutions:
  - Revolution in Strike Warfare
  - Revolution in Network Centric Warfare



# Revolution in Strike Warfare





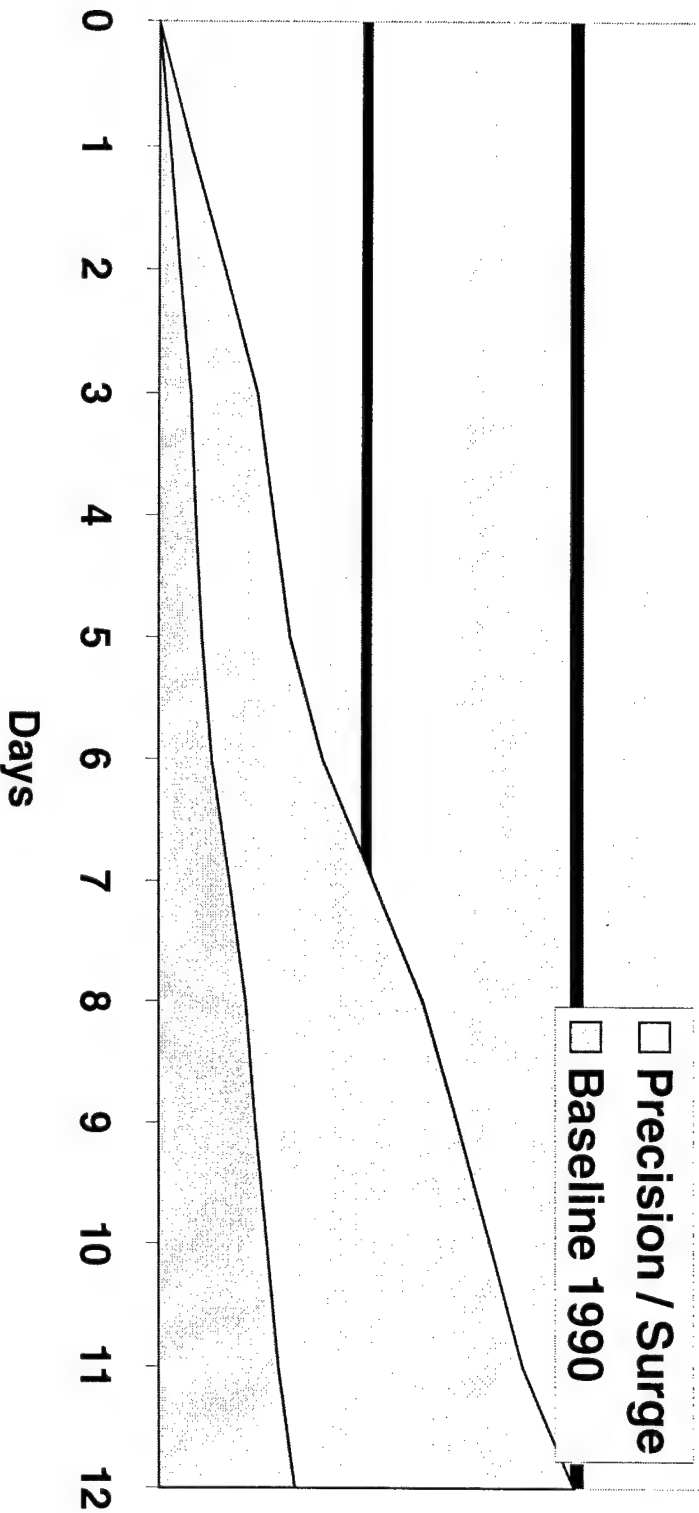
# Revolution in Strike Warfare



## All Precision Air Wing

### Coherent/Lethal/Precise

DMPIs



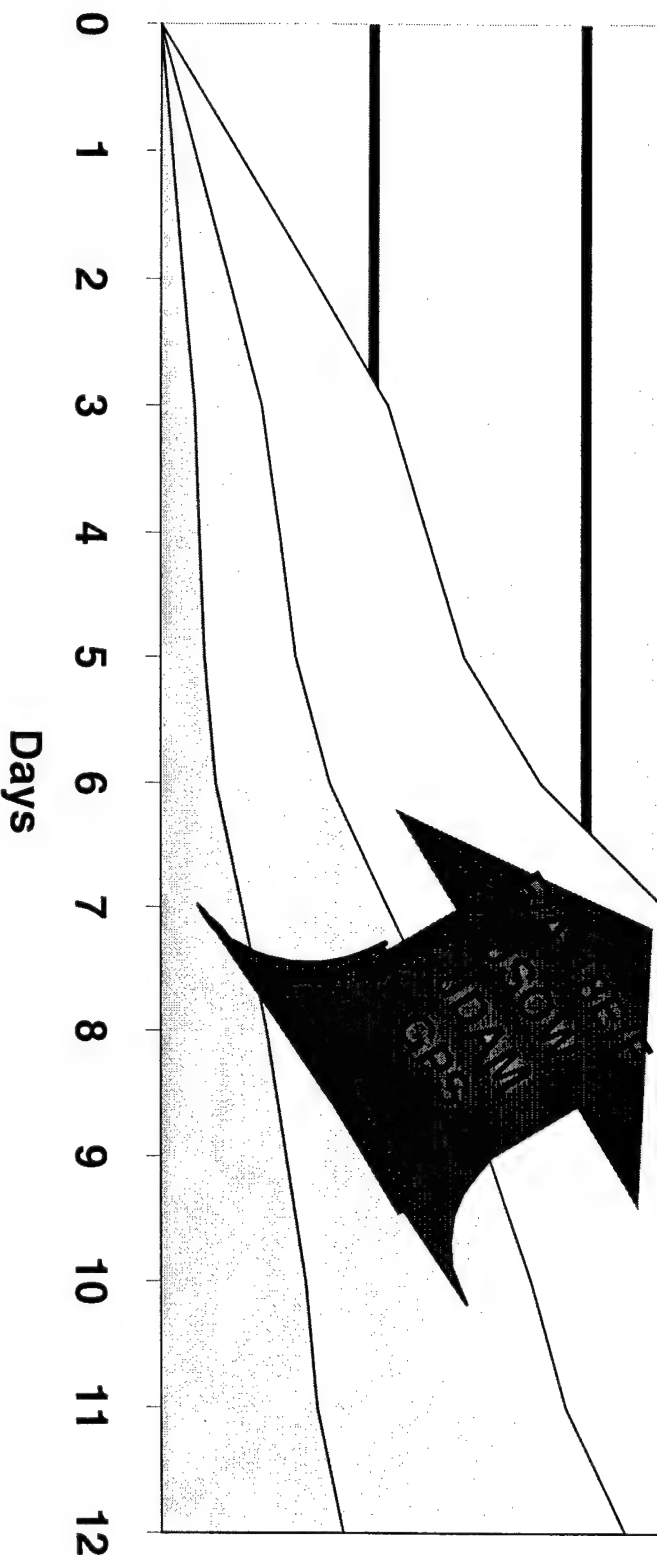


# Revolution in Strike Warfare



**Naval Aviation is on the verge  
of revolutionizing strike warfare  
for expeditionary forces**

DMPI's





# *“Naval Aviation will enable the next revolution... Network Centric Warfare”*



- What is it?
  - The right information to the warfighter
  - The synergy of the network is more powerful than the sum of the platforms
- Divided into three planes
  - Force command / Planning
  - Tactical control
  - Engagement/execution



# Network Centric Warfare



*“Naval Aviation: the key enabler”*

- Collaborative planning
- TAMPS
- Engagement
- CEC
- Command and Control
- JSOW/JDAM
- P-3 AIP
- F/A-18E/F
- Link 16
- SH-60R
- » JTIDS
- CH-60
- » MIDS





# Near-term Network Centric Warfare Capabilities



- UAVs
- RMP
- AESA
- Advanced weapons
  - ATA/ATR



# Unmanned Vehicles



- UCAV
  - Evolution from current family of stand-off weapons -- SLAM-ER, JSOW
- UAV
  - TUAV
  - MAE/HAE



# Naval Expeditionary Forces:

*“America’s enduring national asset”*

- Ever increasing relevance of Naval Expeditionary Forces to America’s deterrence and defense
- Naval Aviation is the enabler for Naval Expeditionary Forces







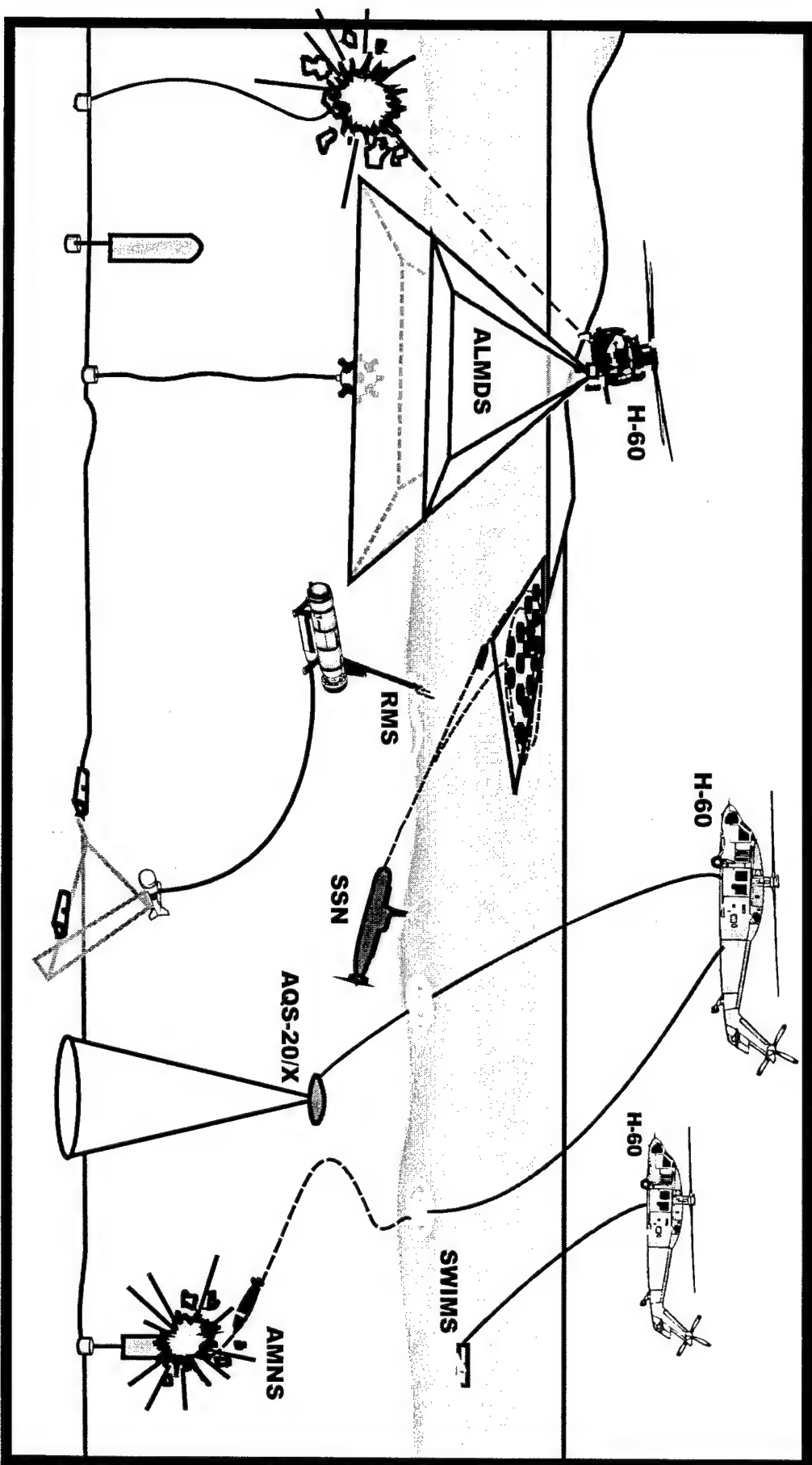
# Back-up





# Where We Are Going

## Organic Mine Countermeasures Systems







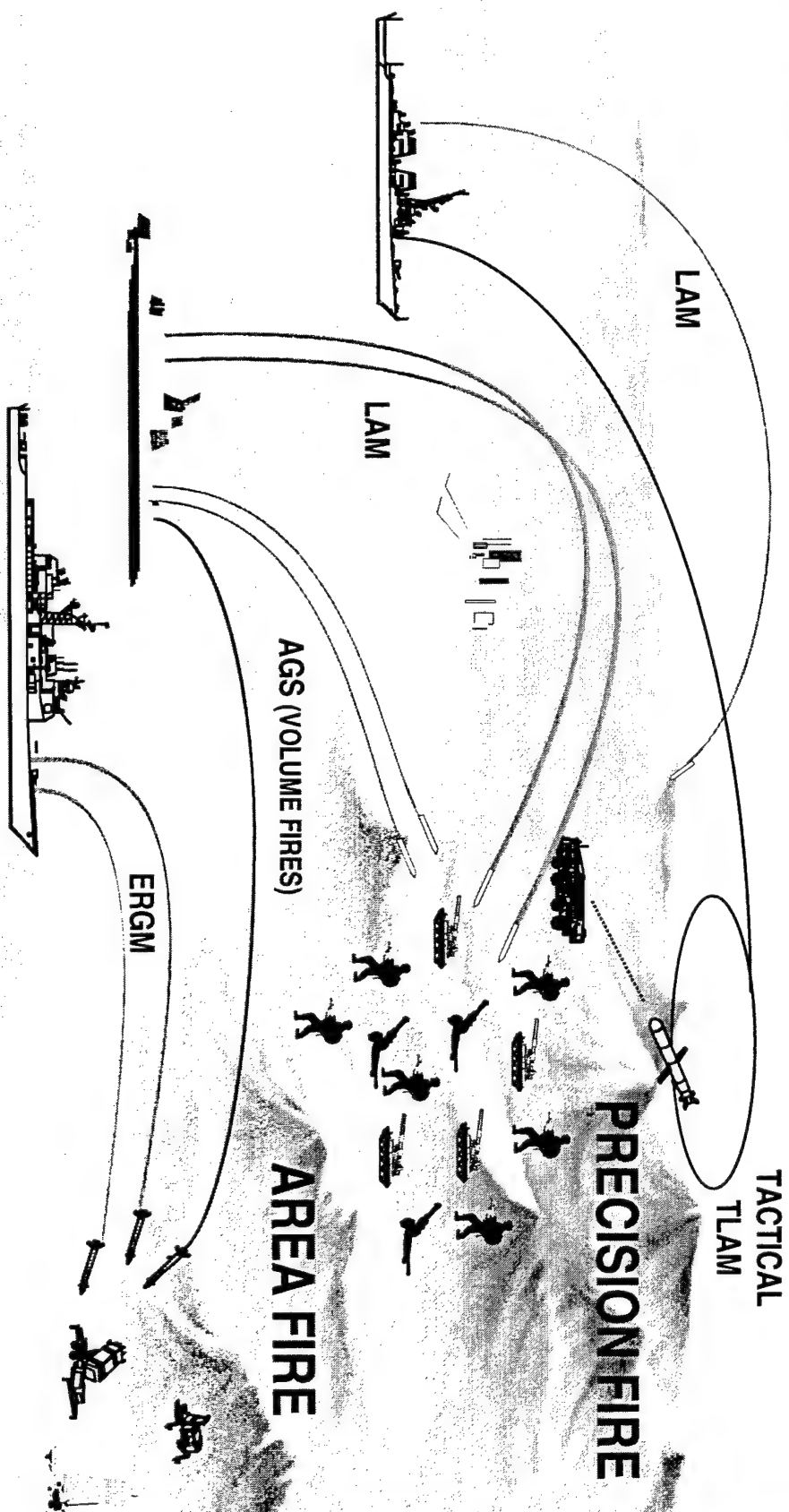
# ***Land Attack Plans and Challenges***

**Captain Ray Pilcher, USN**  
**Head Land Attack Warfare**  
**N864**

2000 Navy Pentagon  
Washington, DC 20350-2000  
Pilcher.Ray@hq.navy.mil

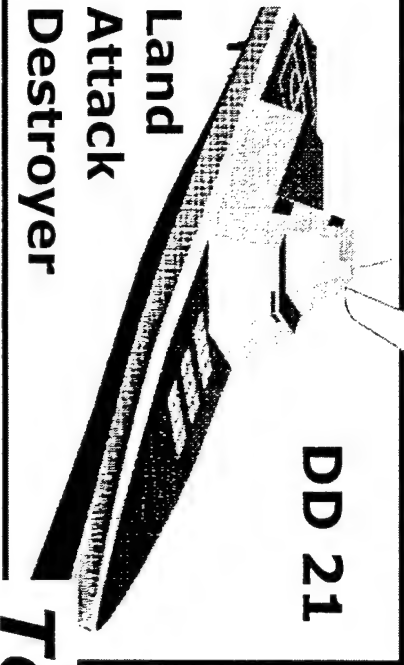


# Land Attack -- Supporting the Land Campaign



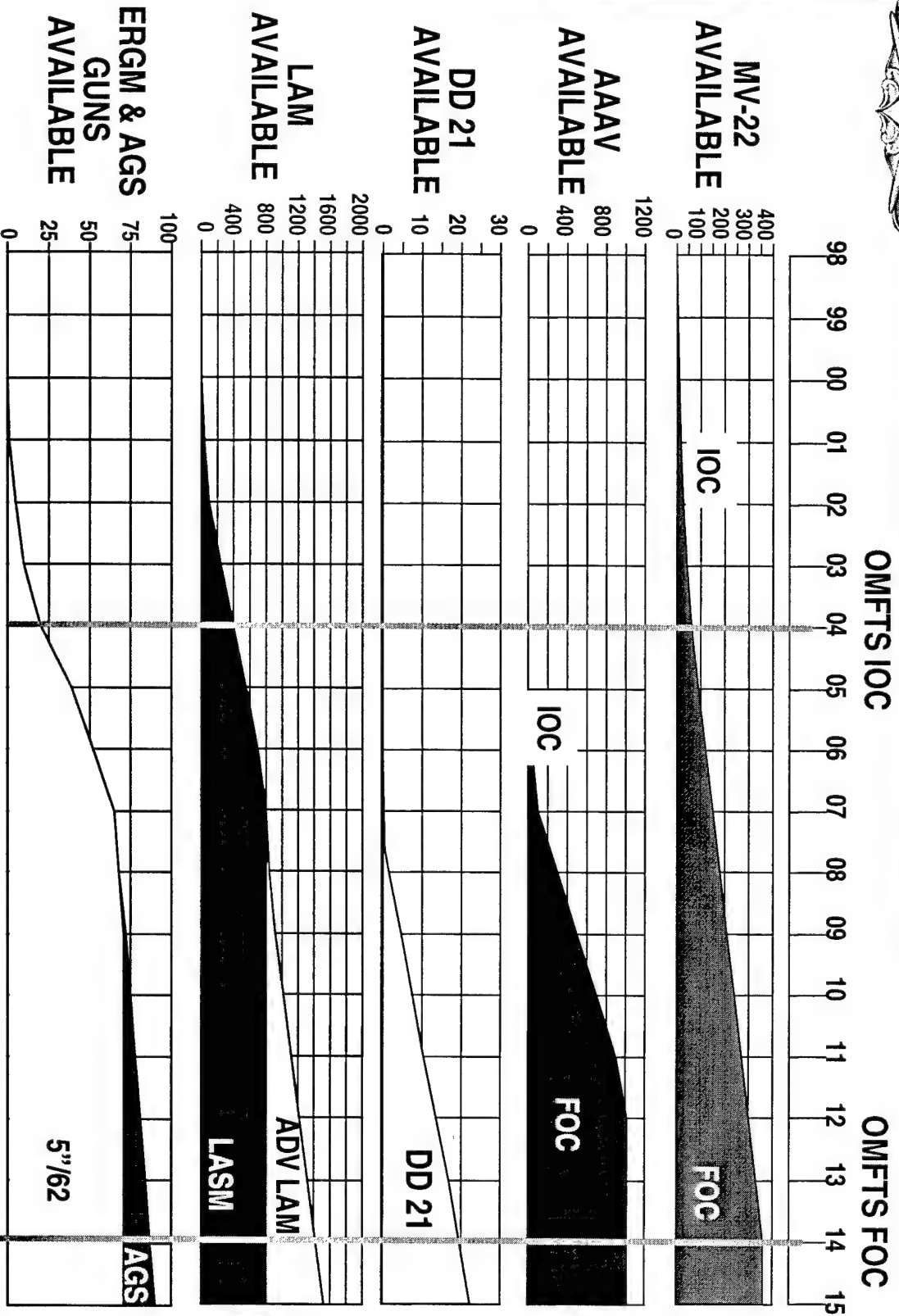
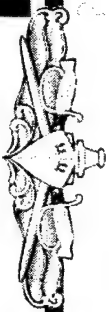
**Reliable, Responsive and Lethal**

# New Land Attack Systems

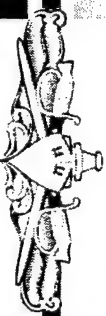


To Support the Warfighter

# Integrated Land Attack Investment Strategy



# "Show Me the Money"



- 5"62/ERGGM -- \$717m
- LASM -- \$171m
- AGS -- \$224m
- NFCS -- \$164m
- TACTICAL TOMAHAWK -- \$700m

**\$0 in FY96 → Over \$2.0B in FY 97-05**

**+**

**Plus another \$6.6B in DD 21**





# *A Great First Quarter*

**But, it's too early**



**To declare Victory**



# ***Challenges Ahead***

---

- **Introducing Land Attack to the Fleet**
- **C4I SRT -- The Holy Grail**
- **Chicken or the Egg? -- New capability or new Doctrine**
- **Basic research/new systems**
- **Acquisition Reform**

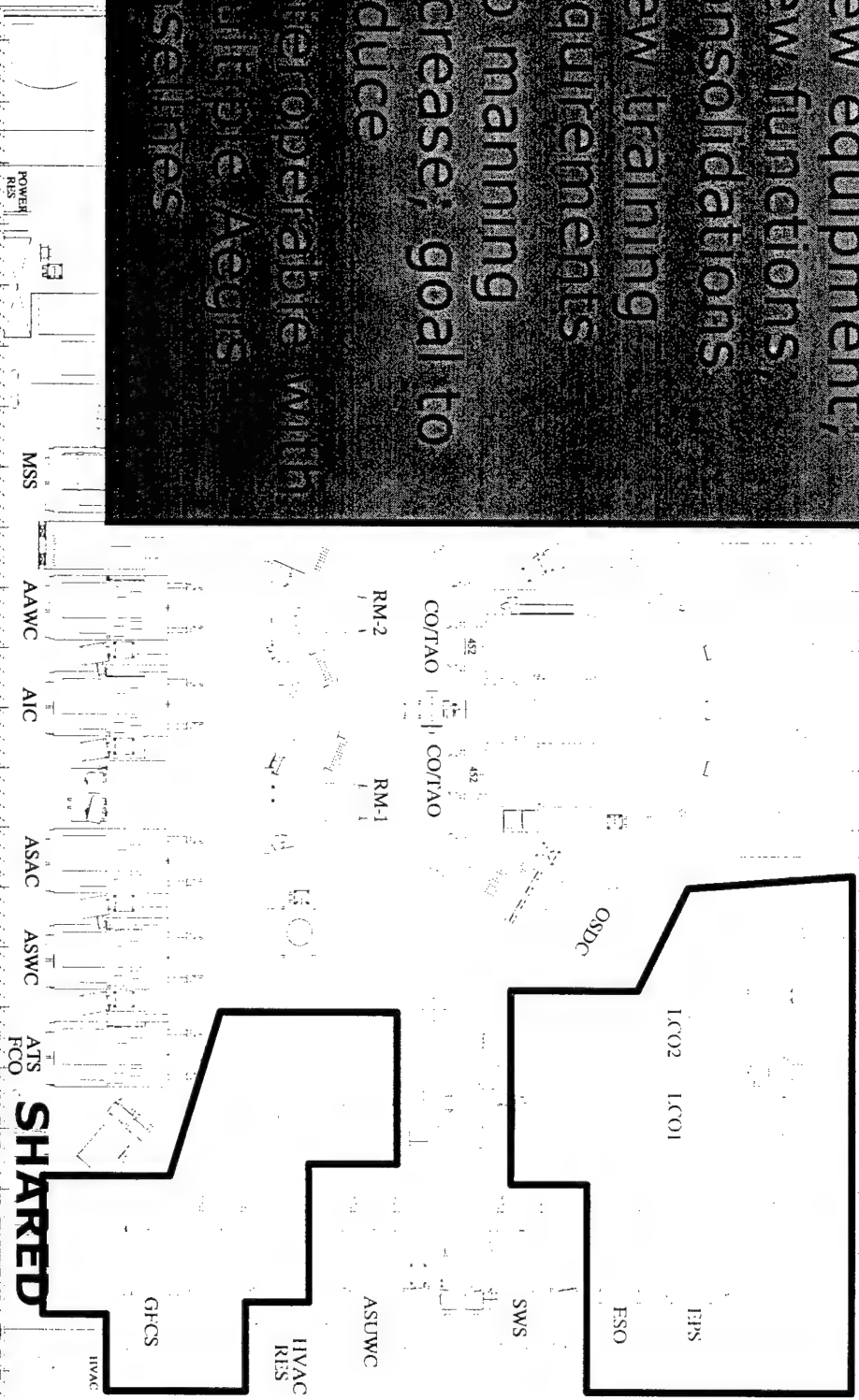
# Adding Land Attack



**DDG 51 CIC**

**DEDICATED  
LAND ATTACK**

- New equipment, new functions, consolidations
- New training requirements
- No manning increase, goal to reduce
- Interoperable with Multiple Aegis Baselines

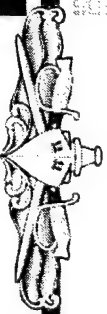


# C4I



- How much bandwidth needed for Land Attack? Dedicated vs. shared?
- BW will be available and cheap ashore; what about at sea?
- "Seaworthy" antennas for small boys?
- LOS comms to ground forces insufficient
- Is "peacetime" BW available in combat?
- Are commercial systems affordable?
- Available for combat? Secure?

# SR&T



- **Detect, ID, Target**

- ▢ Timeliness is critical
- ▢ Auto detection and processing for speed and reduced manning
- ▢ Low TLE for accuracy/efficient weapon use

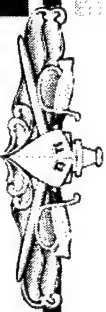
- **Keys**

- ▢ Automatic processing
- ▢ Digital comparisons--changes
- ▢ Multiple sources

- **Issues**

- ▢ Sensor availability
- ▢ Organic vs. non-organic sensors
- ▢ Onboard vs. off-board processing
- ▢ Network availability

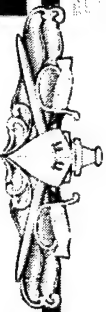
# Doctrine & CONOPS



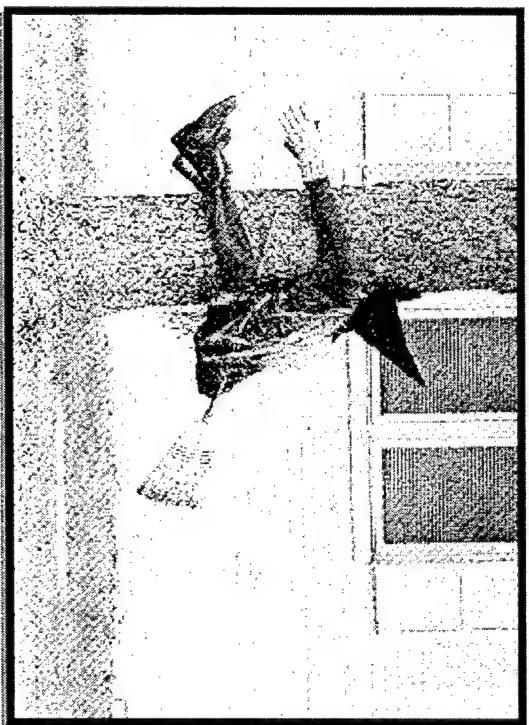
- **Light, mobile forces**
  - ▢ More non-organic fire support
  - ▢ Reliable comms
  - ▢ Common Operational Picture vs. procedural control
- **Evolving Fires Doctrine?**
  - ▢ Area fires with precise \$25K rounds?
  - ▢ Shot-Spot-Adjust-Shot--with 7 minute time of flight?
  - ▢ Danger close? Check fire?
  - ▢ Role of the Joint Fires Control Center?



# *Air Space Deconfliction*

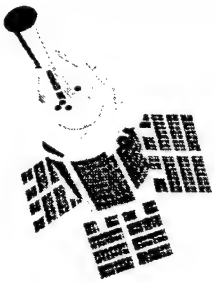
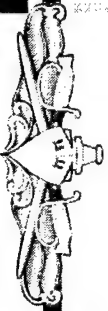


## **Not a new problem**

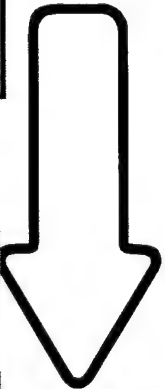


- **Lots going on:**
  - ▣ **CEC**
  - ▣ **AADC**
  - ▣ **TBMCS**
  - ▣ **JCSE**
- **SIAP vs. Procedural**
- **Doctrine Implications**
  - ▣ **JP 3-09**
  - ▣ **Principally manned aircraft**
  - ▣ **Evolve with C4I/Network Centric Warfare**
- **Must satisfy to use new LA capabilities**

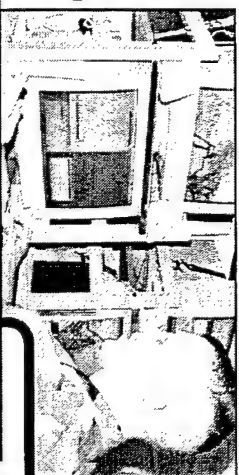
# Sensor to Shooter



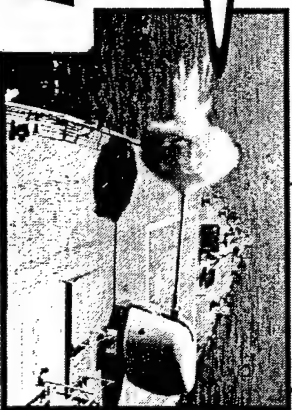
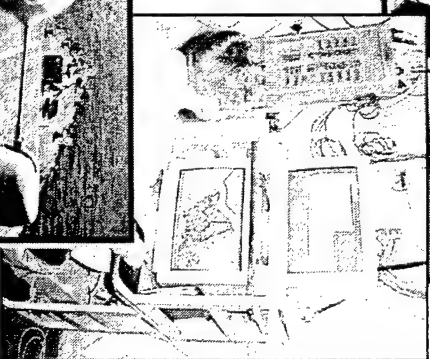
**SENSOR**



**COMMAND &  
DECISION**

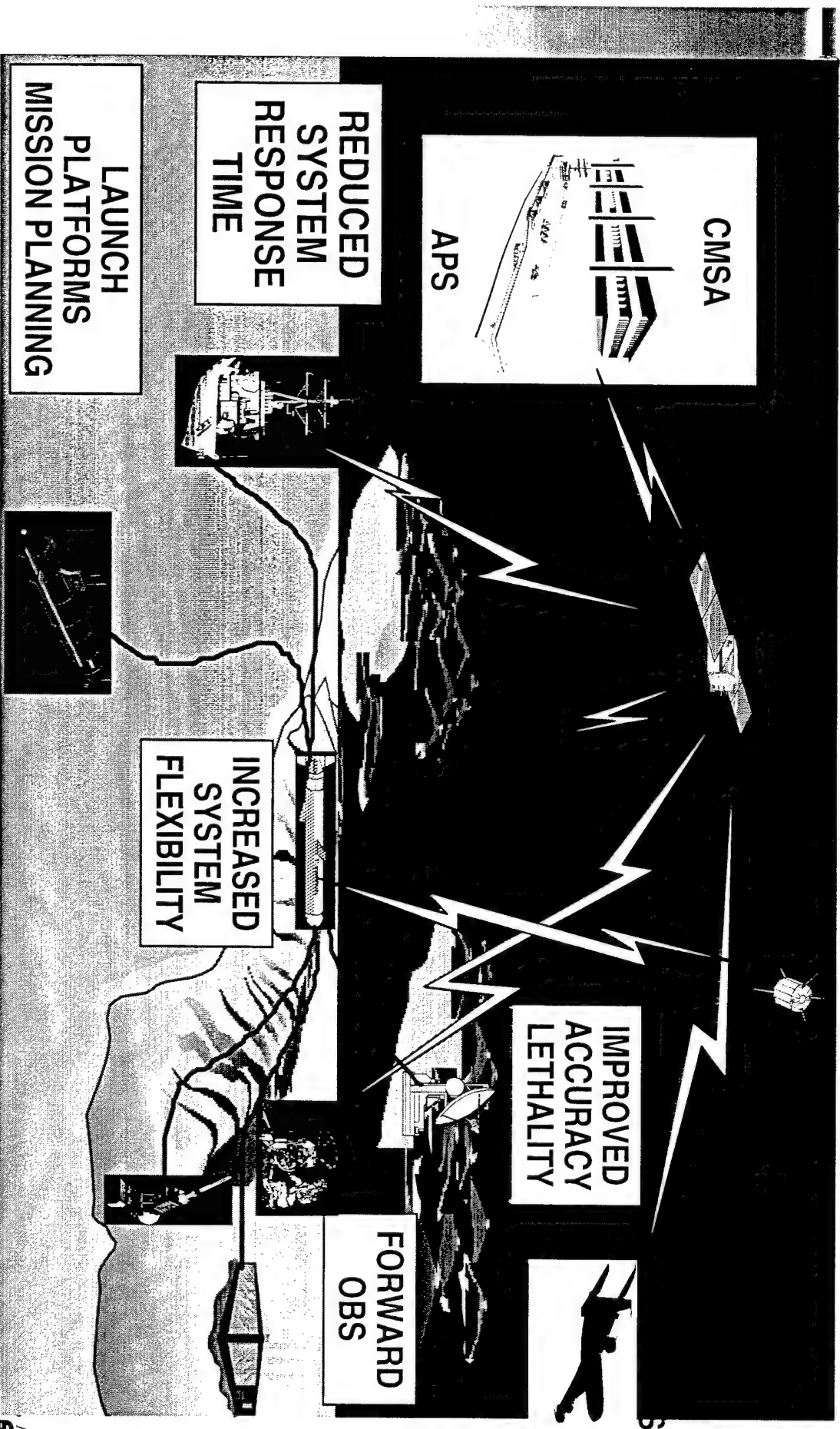


**SHOOTER**

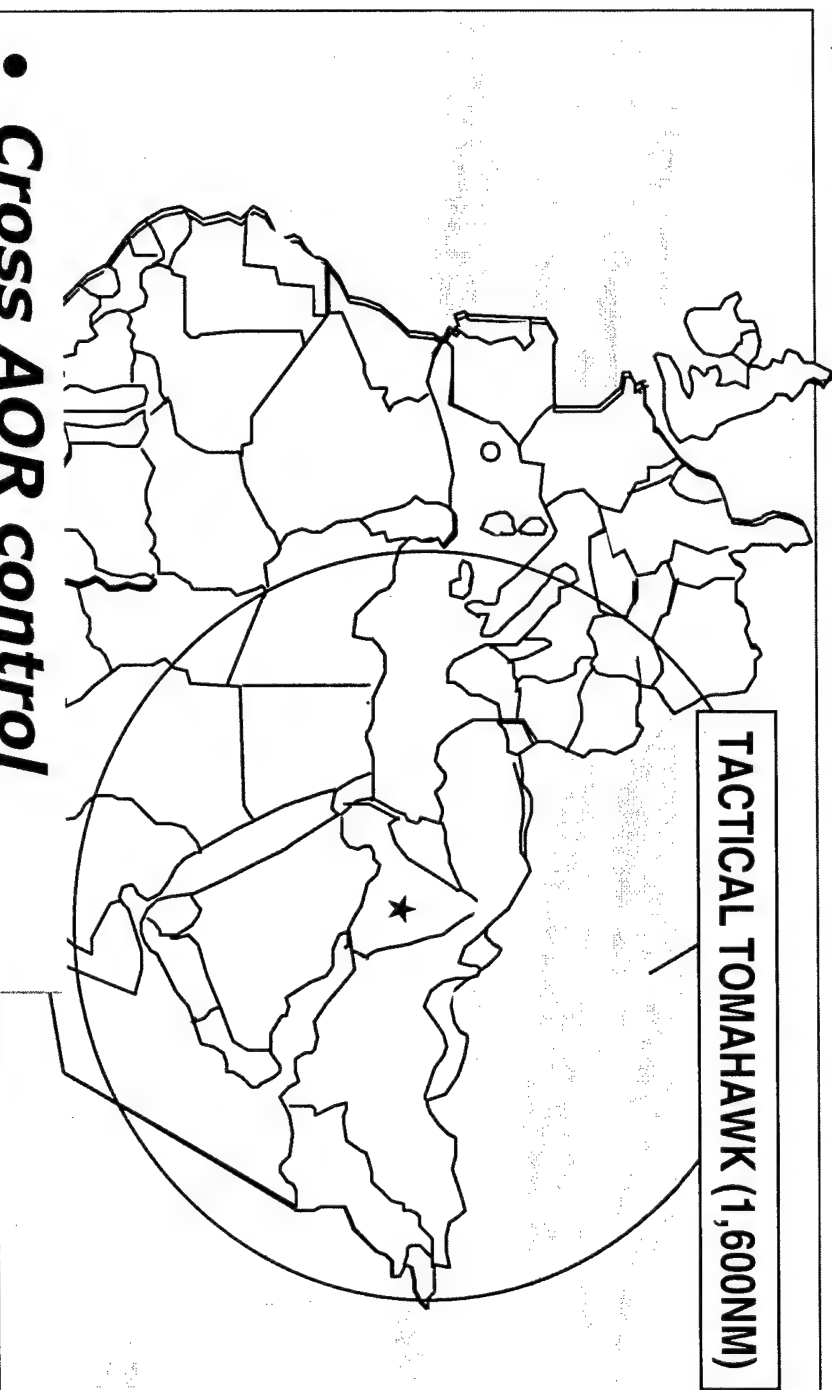
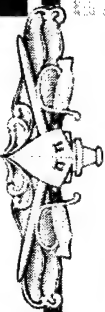


***Improved Response Required***

# Using Tactical Tomahawk



# Tactical Tomahawk Stand Off



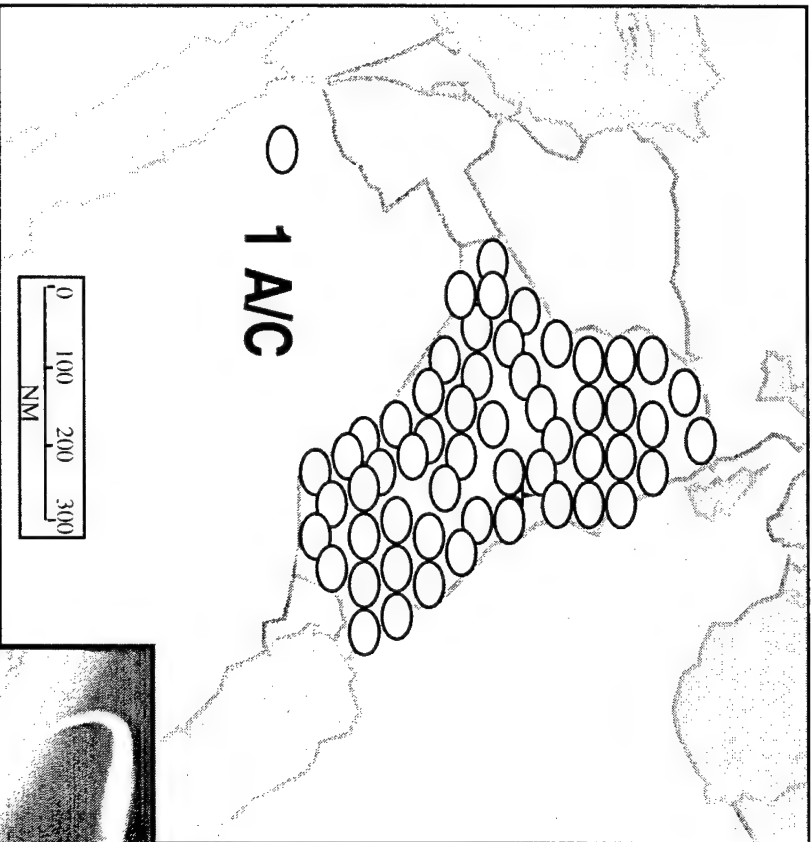
- **Cross AOR control**
- **Ship assignments**
- **Air Space clearance**
- **Fratricide**

# Hypersonic Missile Coverage

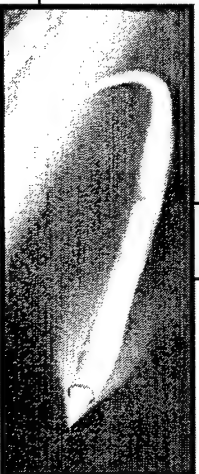
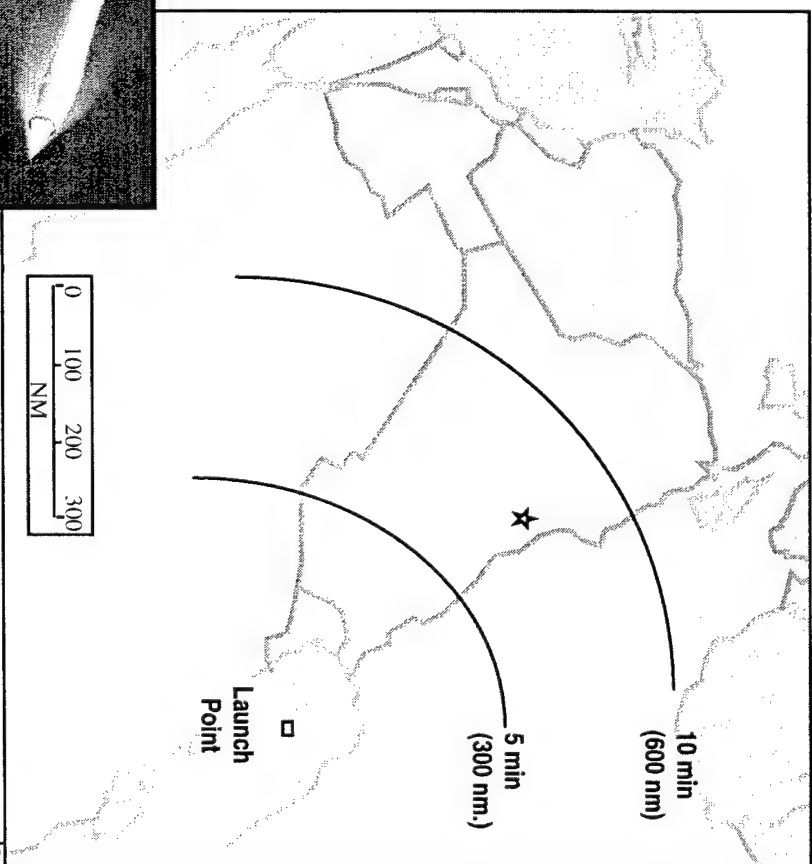


NUMBER OF AIRCRAFT REQUIRED TO BE ON STATION TO  
PROSECUTE TARGET IN 10 MIN.

**CURRENT**



**MACH 6**



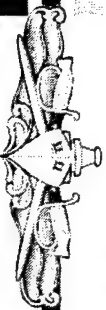
# COTS



- Opportunities, costs and risks
- Is DII COE compliant a guarantee?
- Refresh
  - ↳ New software too?
  - ↳ Is it funded?
  - ↳ Refresh cycle support the acquisition cycle?
- Life cycle support?
- We're still learning



# DD 21 -- Revolutionary



DD 21

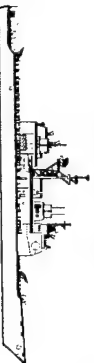


## DD 21 DESIGNED AND BUILT AS A SYSTEM

- Industry Design
- Revolutionary:

Integrated Electric  
Power/Propulsion System  
"Stealth" Hull/Ship  
Integrated Topside Design  
Survivability Changes  
Manning Reductions  
Open Computer Architecture  
Remote Weapons Launch

CG 47



DD 963



- Military Design
- Traditional Manning
- Gas Turbine Propulsion
- Same Hull/Mechanical
- Revolutionary AEGIS Combat System

- VLS (52-73)
- SM-2 Missile
- 5"54 Guns
- Backfit 5"62 (ERGM) Gun

DDG 51

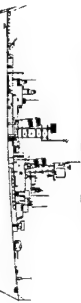


- Military Design
- Traditional Manning
- Gas Turbine Propulsion
- New Hull/Mechanical
- AEGIS Combat System

- VLS
- SM-2 Missile
- 5"54 Guns
- Improved Survivability
- Backfit 5"62 (ERGM) Gun

- Robust Joint Seamless C4I
- Vertical Advanced Gun System
- Advanced Undersea Warfare & Mine Countermeasures Systems
- Engineered for Reduced Maintenance
- Land Attack Focus
- Cost as an Independent Variable

DDG 37

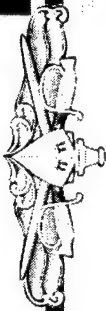


- Military Design
- Traditional Manning
- 1200 PSI Steam Propulsion
- SM-1ER Missiles & 5"54 Gun
- Gas Turbine Propulsion
- New Hull/Mechanical
- Point Defense Missile & 5"54 Gun

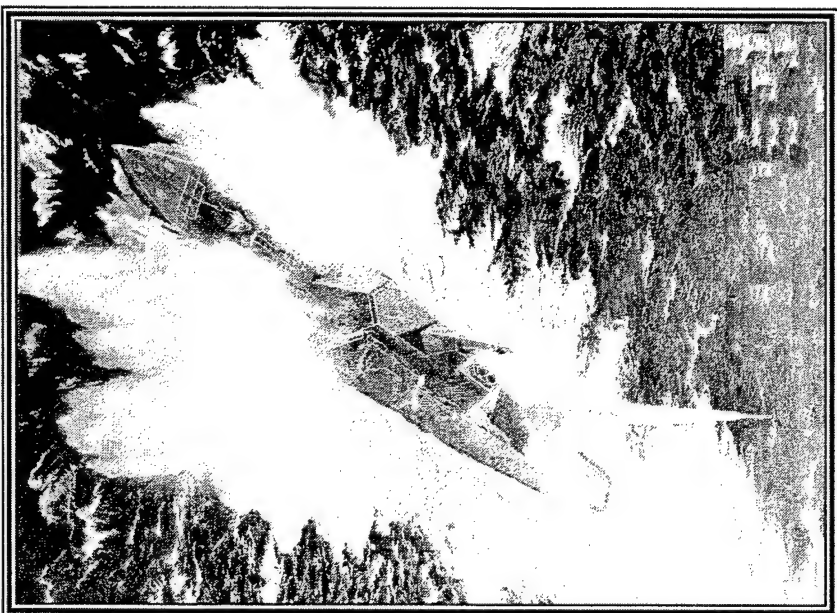
SIGNIFICANT SYSTEM CHANGES FROM PREVIOUS CLASS

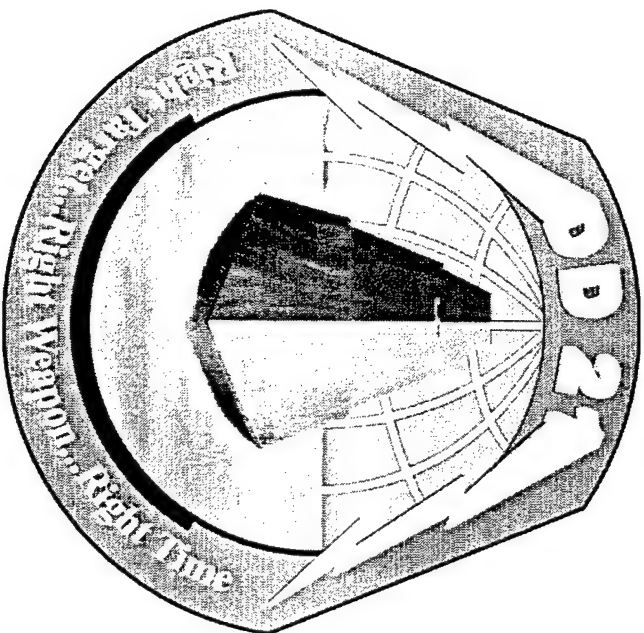
1960 1965 1970 1975 1980 1985 1985 1990 1995 2000 2005

# Land Attack



- **Dynamic**
- **Strongly Supported at the Highest Levels**
- **Work in Progress**
- **Frequent Dialogue With Marine Corps and Fleet**
- **DD 21 is the Centerpiece**
- **Success will require our combined efforts**





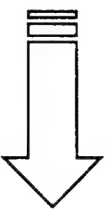
CDR Jon Sharpe, USN  
DD 21 Program  
PMS500TW

05 November 1998

# DD 21 Perspective *Expeditionary Warfare Conference*

# ***Agenda***

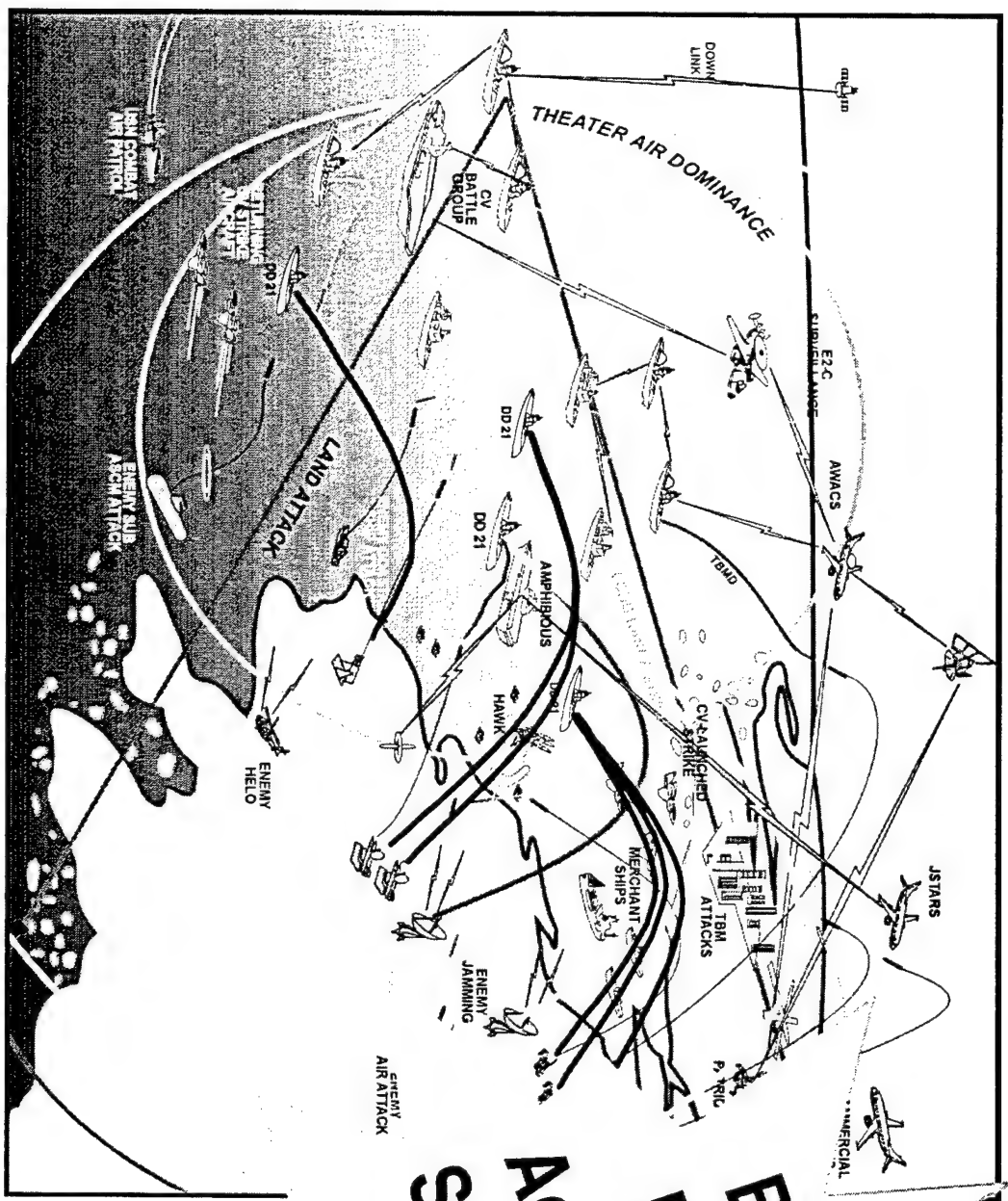
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## **◆ Challenges of the Operating Environment**

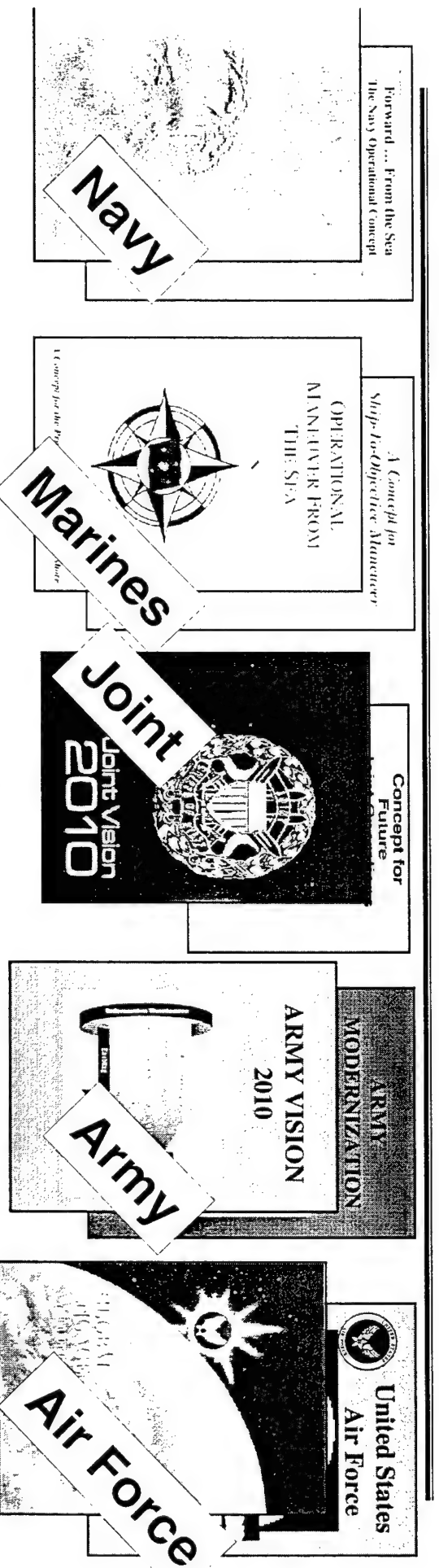
- ◆ DD 21 Roles in the Joint Force**
- ◆ DD 21 Design Features**

# New Operational Paradigm



Beirut  
Bosnia  
Adriatic Sea  
Sea of Japan  
Liberia  
Arabian Gulf  
Sidra

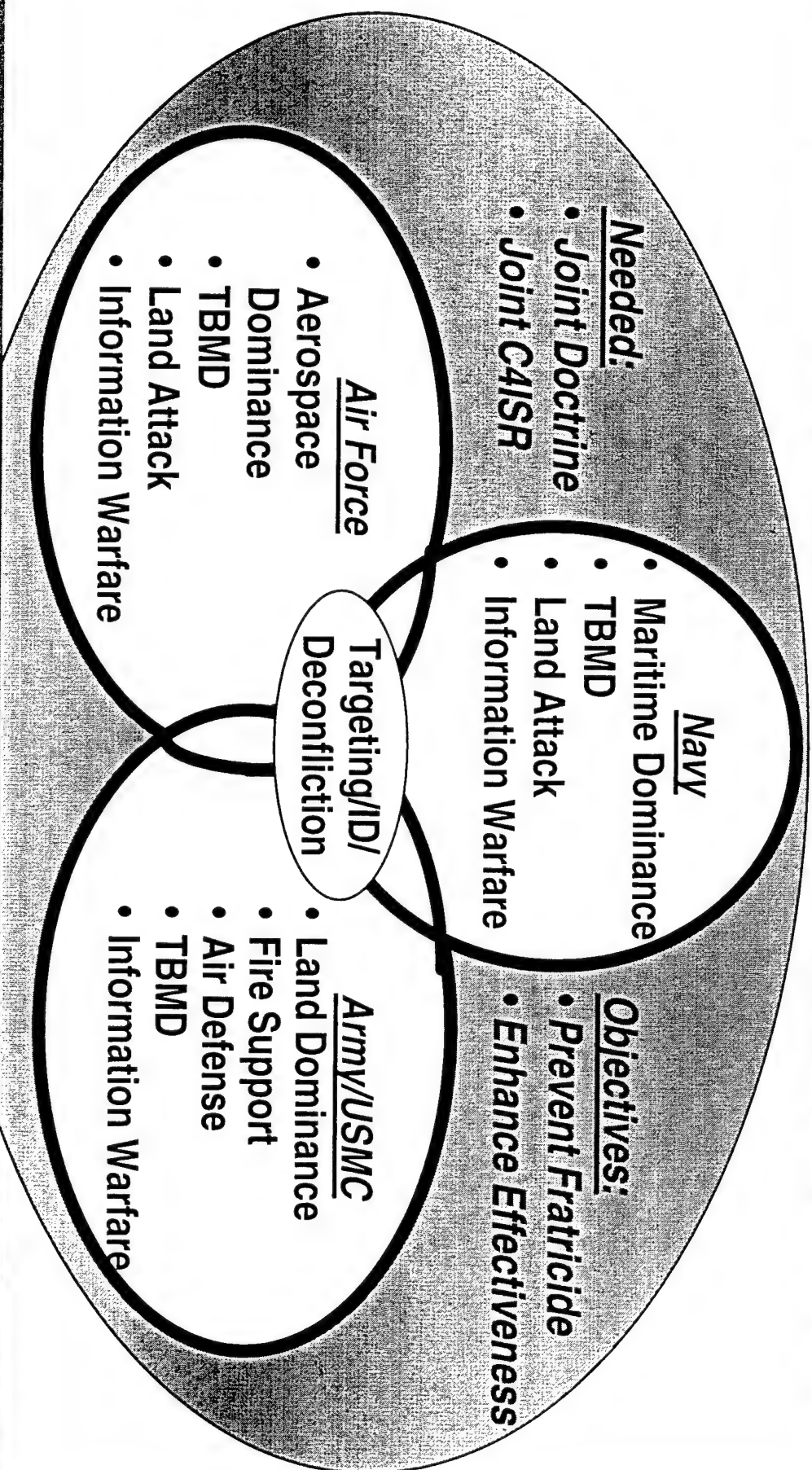
# New Doctrinal Paradigm



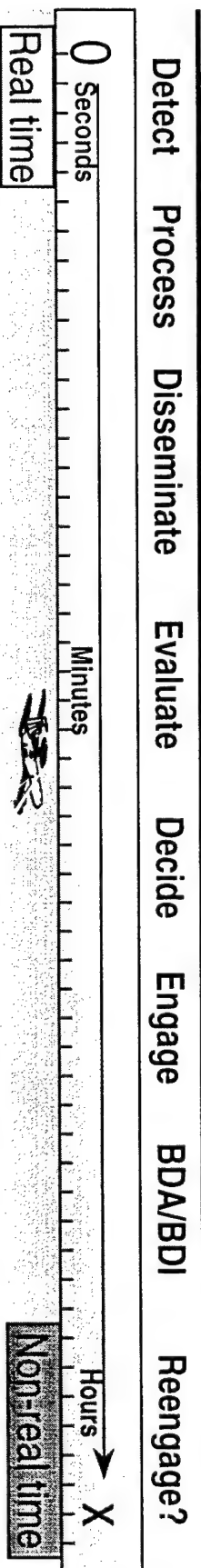
- ◆ Provide context to what the battlespace will look like in 2010
  - Assess the impact of new doctrines, concepts, threats
  - Identify what Joint Force Commanders and Army / Marine Corps forces will require from DD 21
  - Identify those systems and capabilities with which DD 21 must be interoperable



# Tactics, Techniques and Procedures Drive Force Capability and Interoperability Requirements



# The Detect-to-Engagement Challenge

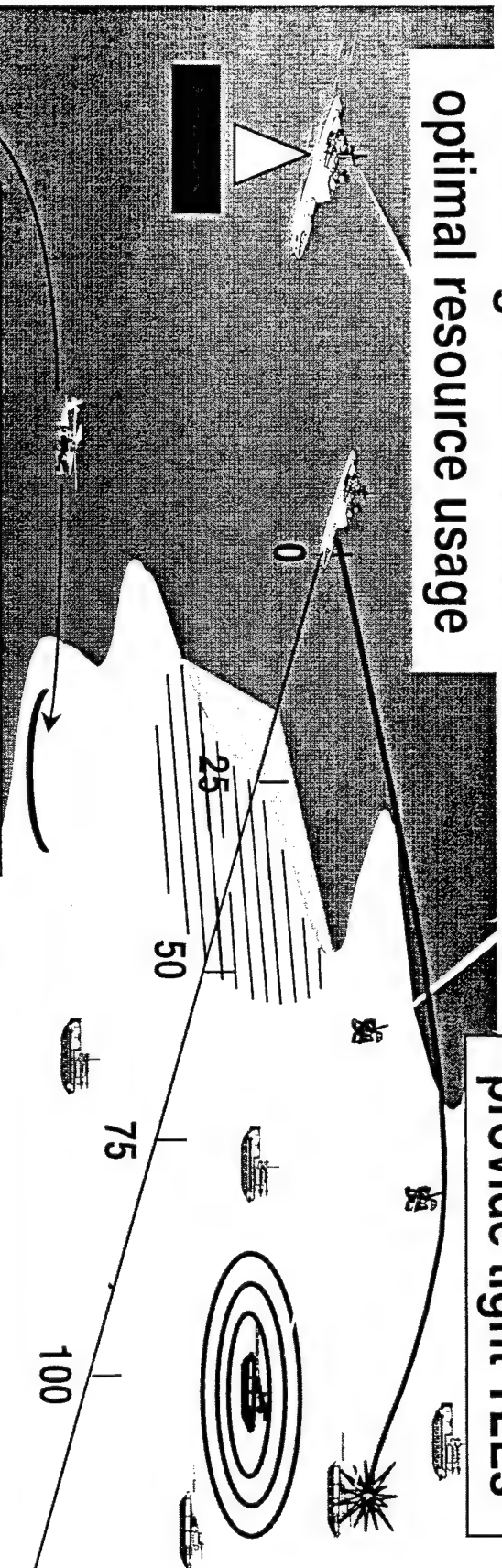


Planning must enable optimal resource usage

Sensors must provide tight TLEs

C3 must provide battle space awareness, ID, deconfliction and clearance to fire.

DTE process must occur within the target's dwell time!



# *Agenda*

---

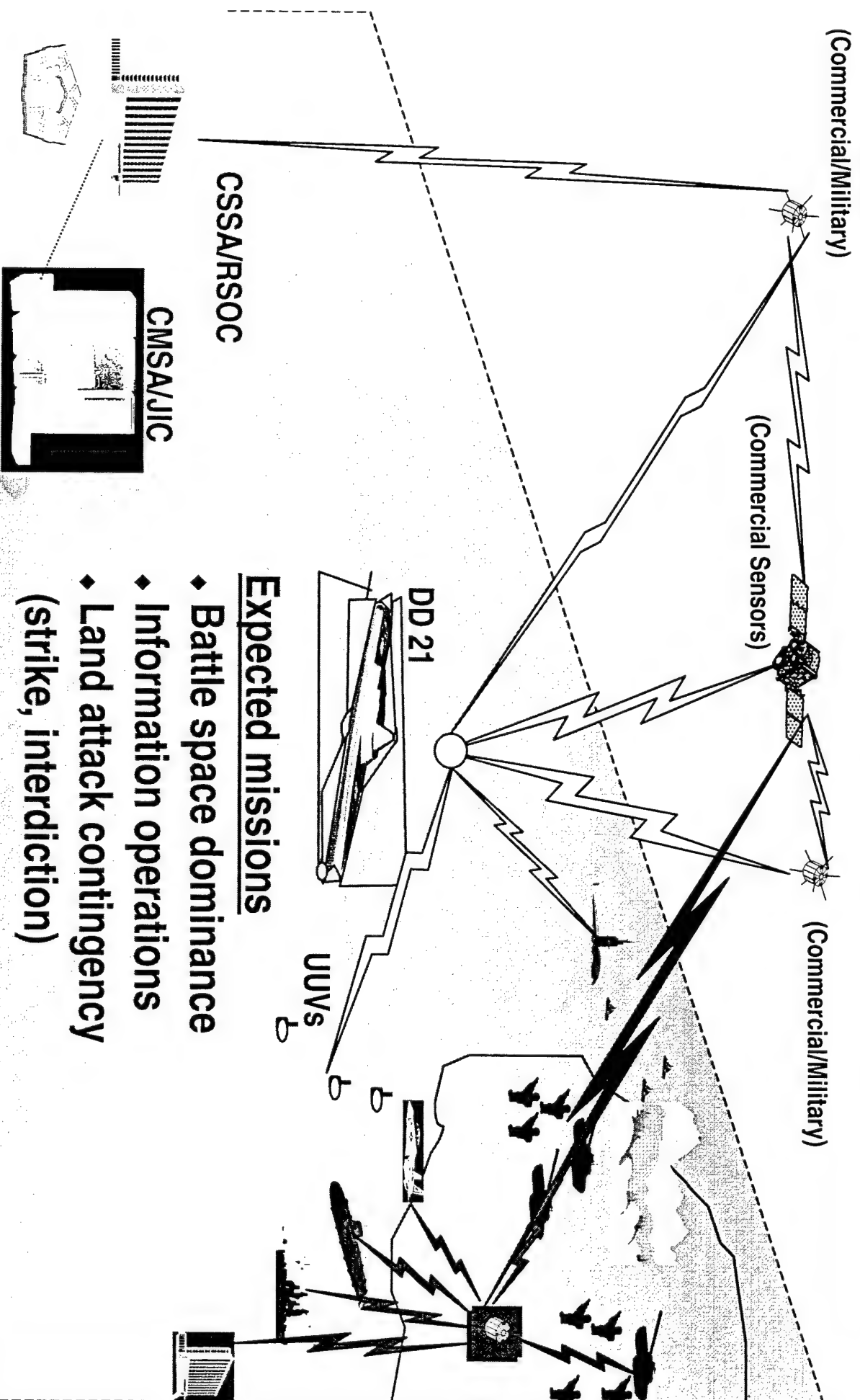
- ◆ **Challenges of the Operating Environment**



- ◆ **DD 21 Roles in the Joint Force**
- ◆ **DD 21 Design Features**

# DD 21 in the Network-Centric Battle Space

## Forward Presence

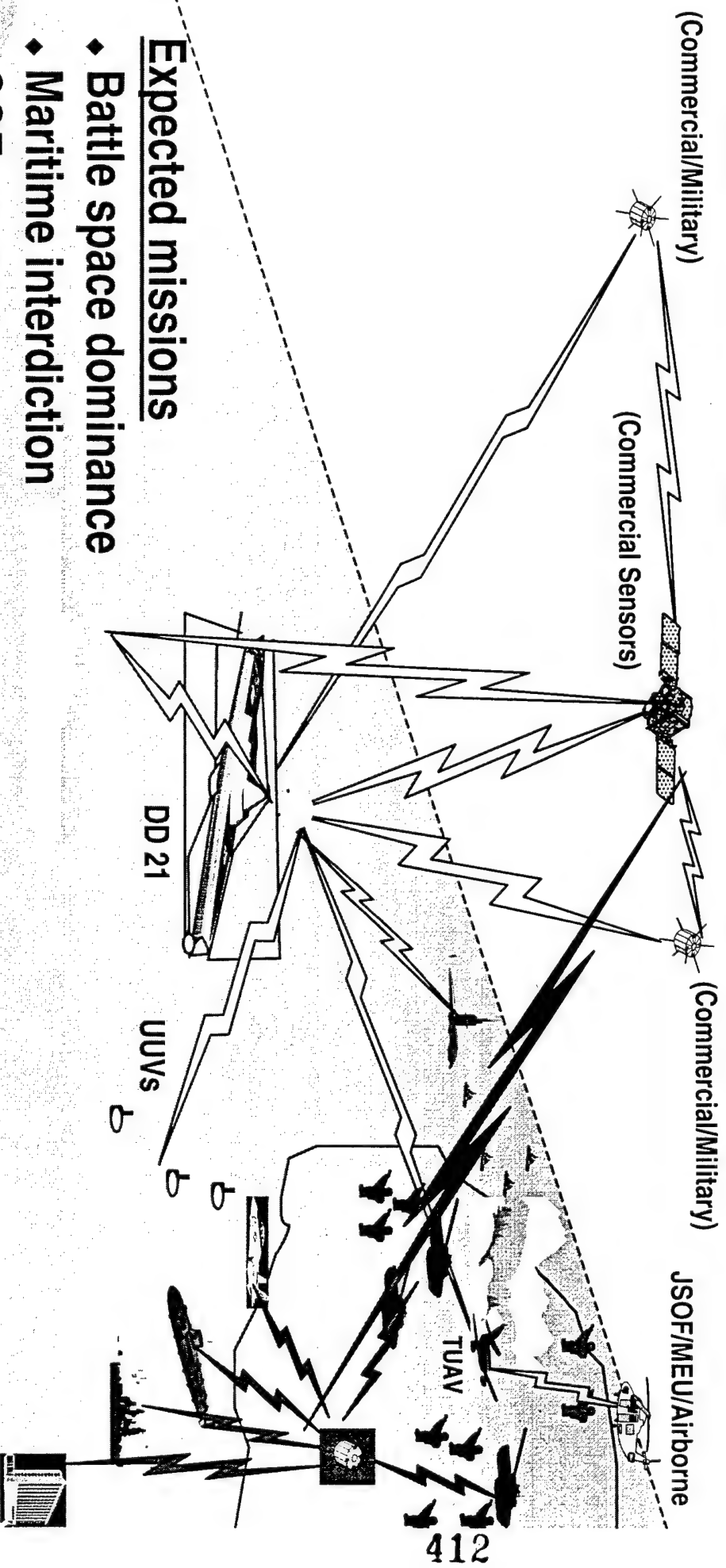


### Expected missions

- ◆ Battle space dominance
- ◆ Information operations
- ◆ Land attack contingency (strike, interdiction)

# DD 21 in the Network-Centric Battle Space

## Crisis Response/Low Intensity Conflict



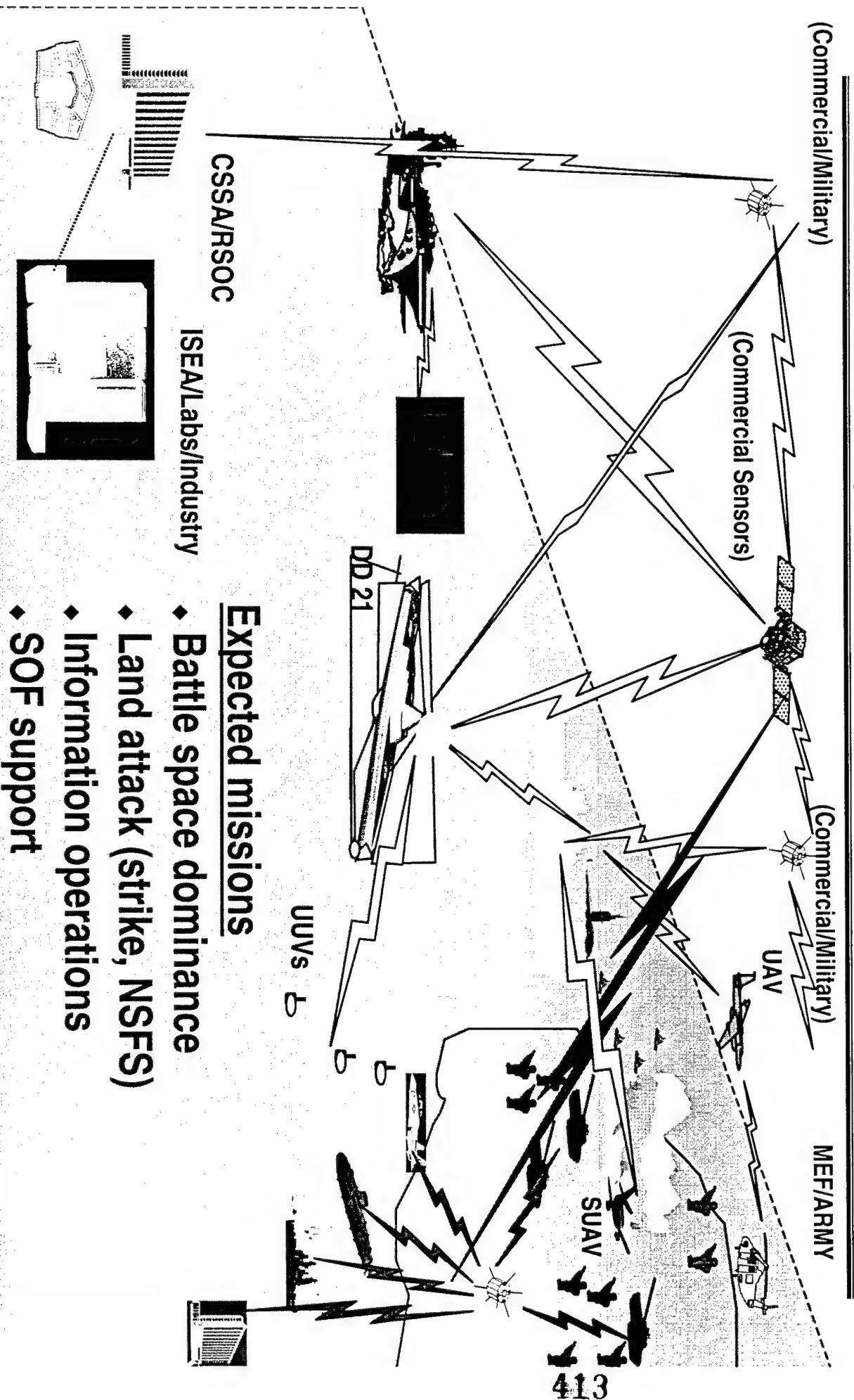
### Expected missions

- ◆ Battle space dominance
- ◆ Maritime interdiction
- ◆ SOF support
- ◆ Information operations
- ◆ Land attack (strike, NSFS) NEO



# DD 21 in the Network-Centric Battle Space

## Major Regional Conflict





# *Agenda*

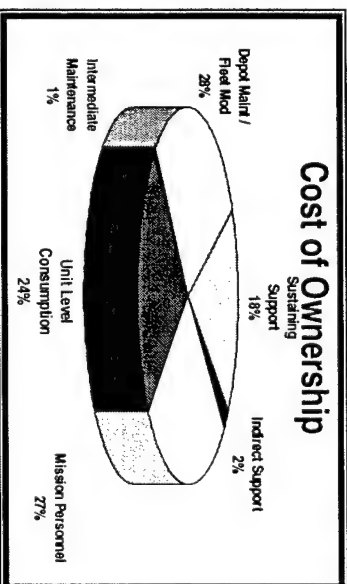
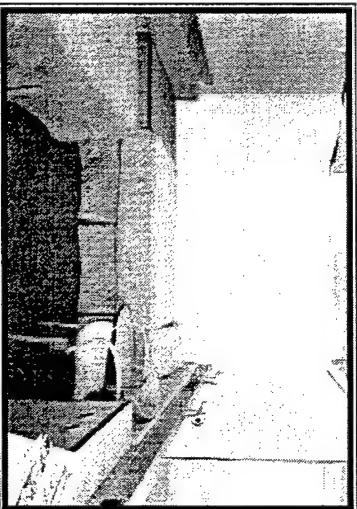
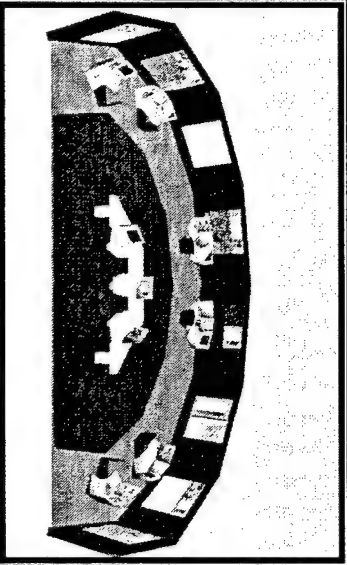
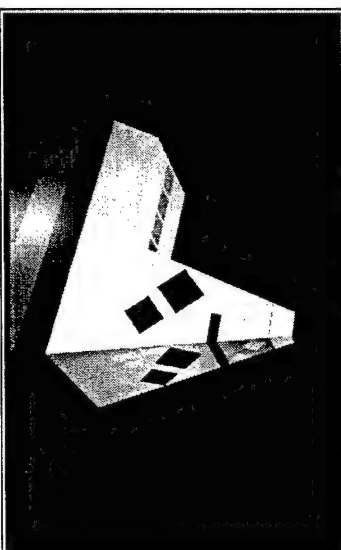
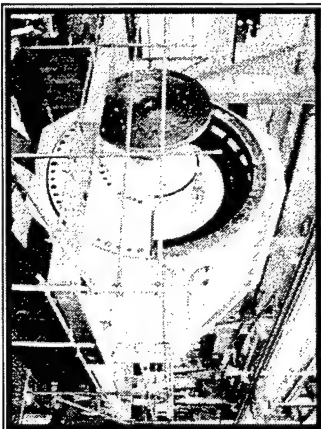
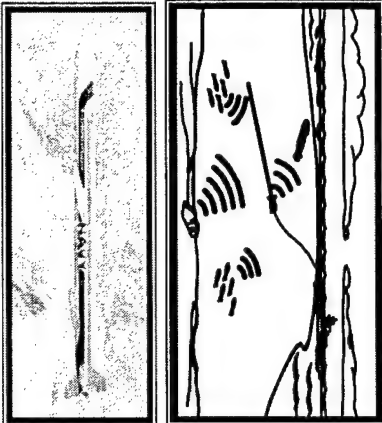
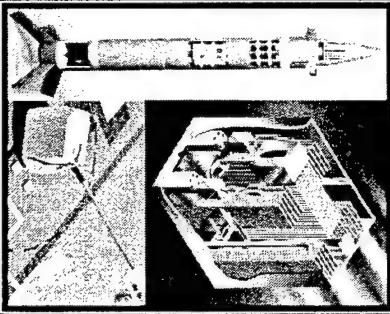
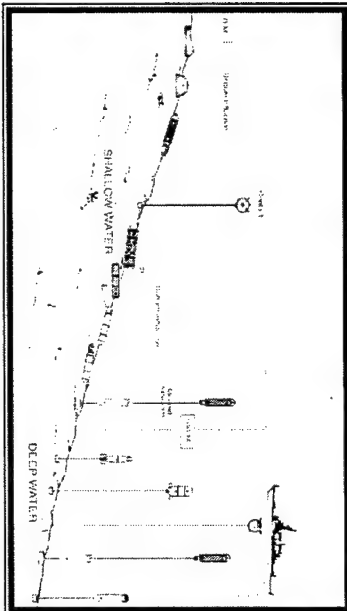
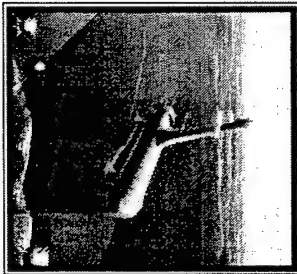
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## ◆ Challenges of the Operating Environment

### ◆ DD 21 Roles in the Joint Force

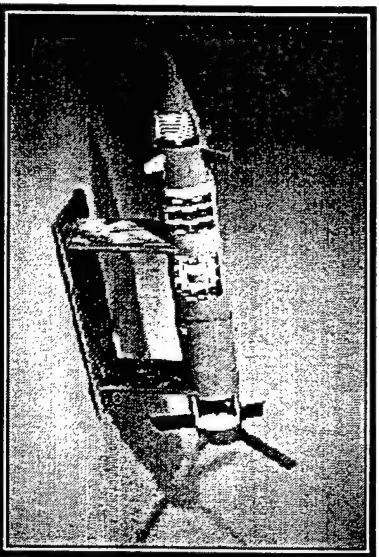
### ◆ DD 21 Design Features

# How is DD 21 Unique?

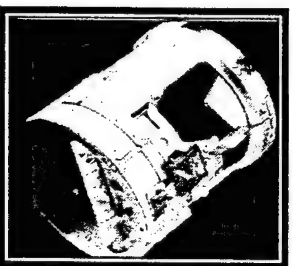


# Advanced Munitions

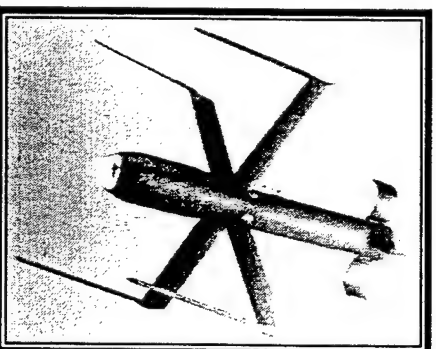
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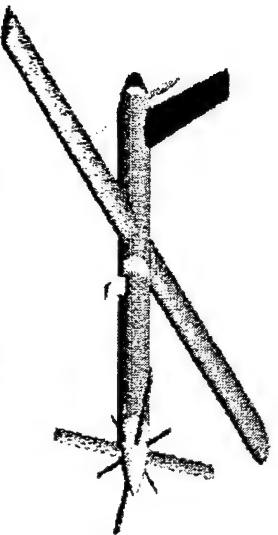
**Extended Range Guided  
Munition**



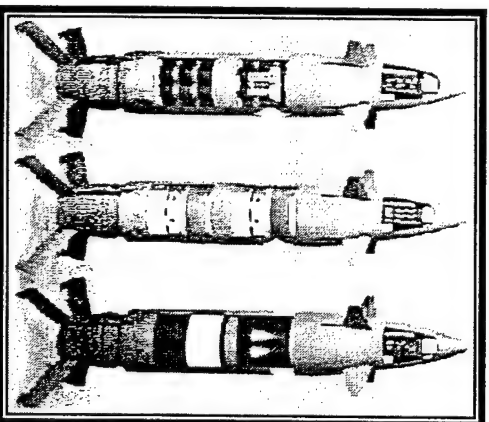
**SADARM**



**Brilliant Anti-Tank  
Munition**



**Forward Air  
Support Munition**

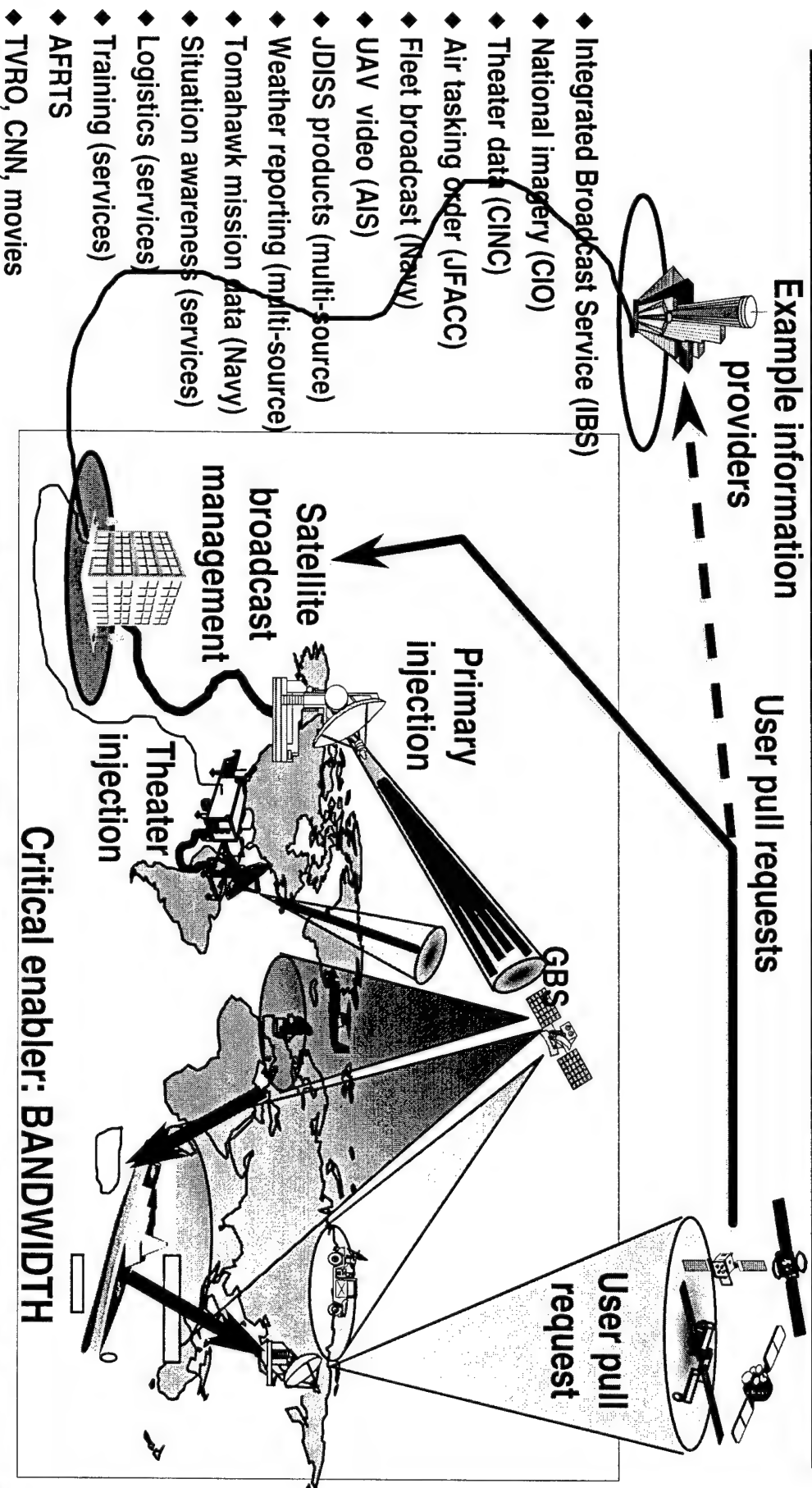


**XM 982 Program  
ER-DPIC M  
SADARM  
UNITARY**



**Future Land Attack  
Missile**

# Information Superiority



Autonomous Target Recognition  
All-Weather, Day/Night Capability  
Automatic Target Recognition

Docker: Sensor to Sensor

The JSTARS

With The C2W Data Link

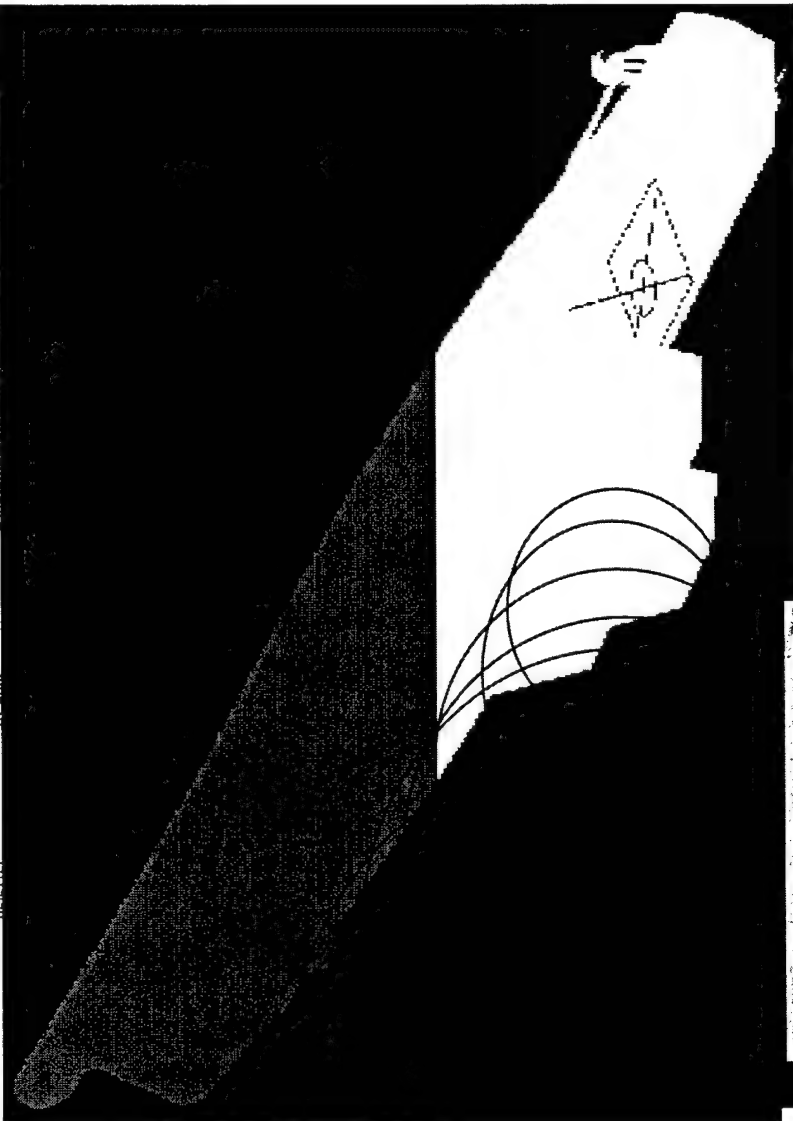
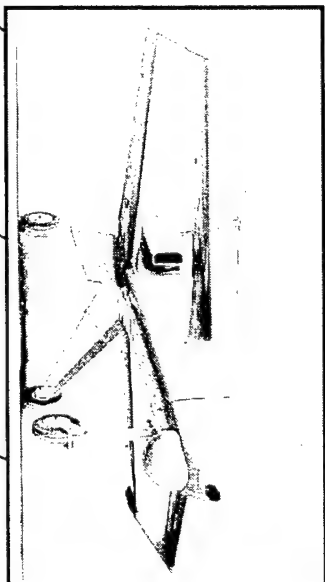
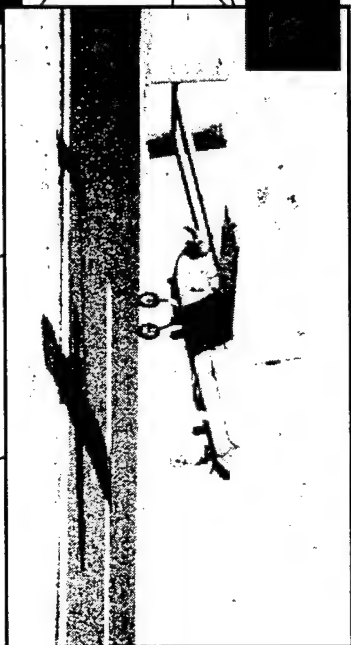
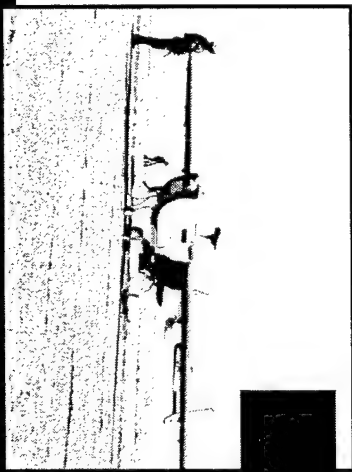
JSTARS

HMAE UAV

U2

SIGINT, SAR, MTI,

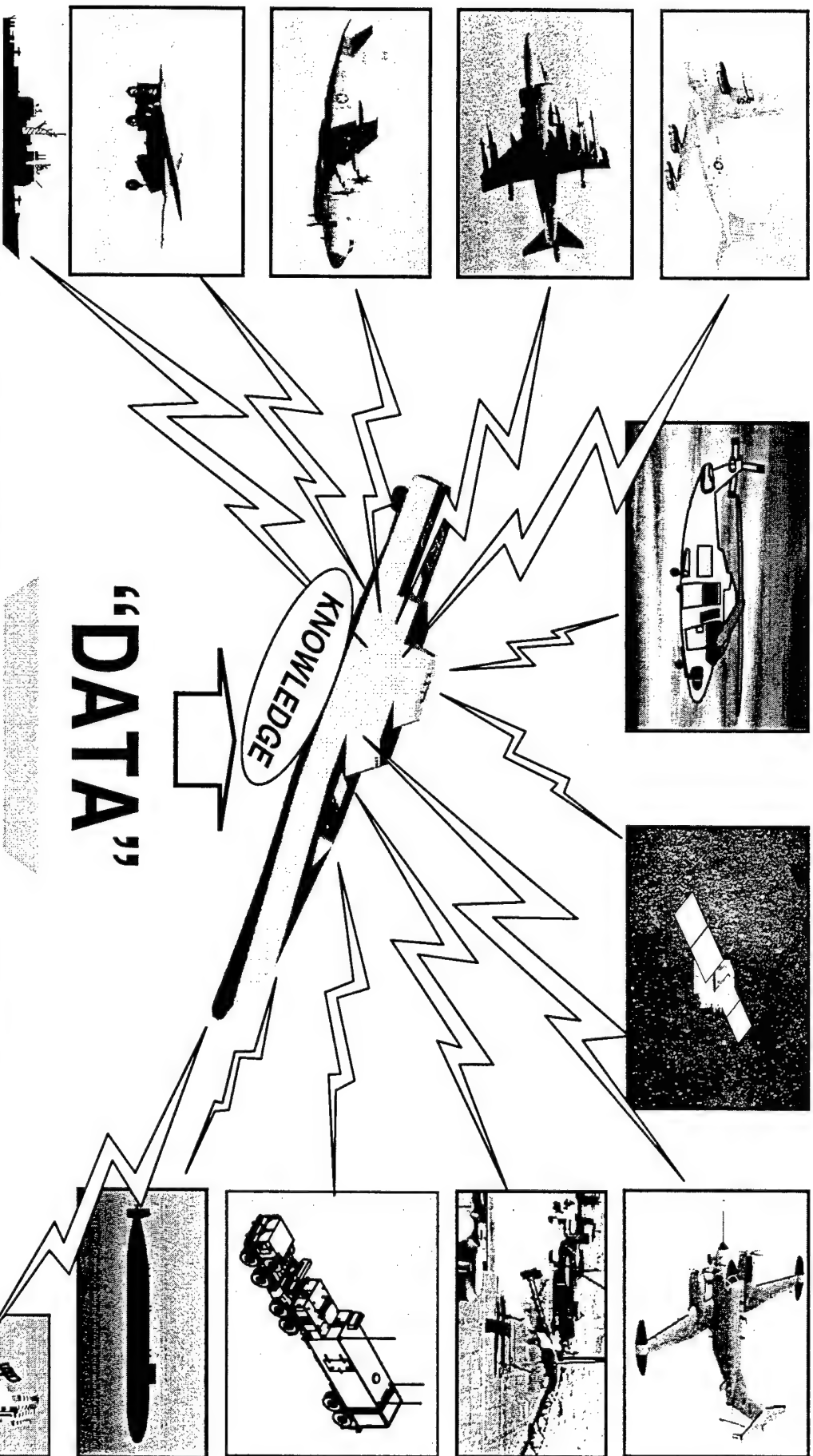
# Dominant Battle Space Awareness and Targeting



UUV

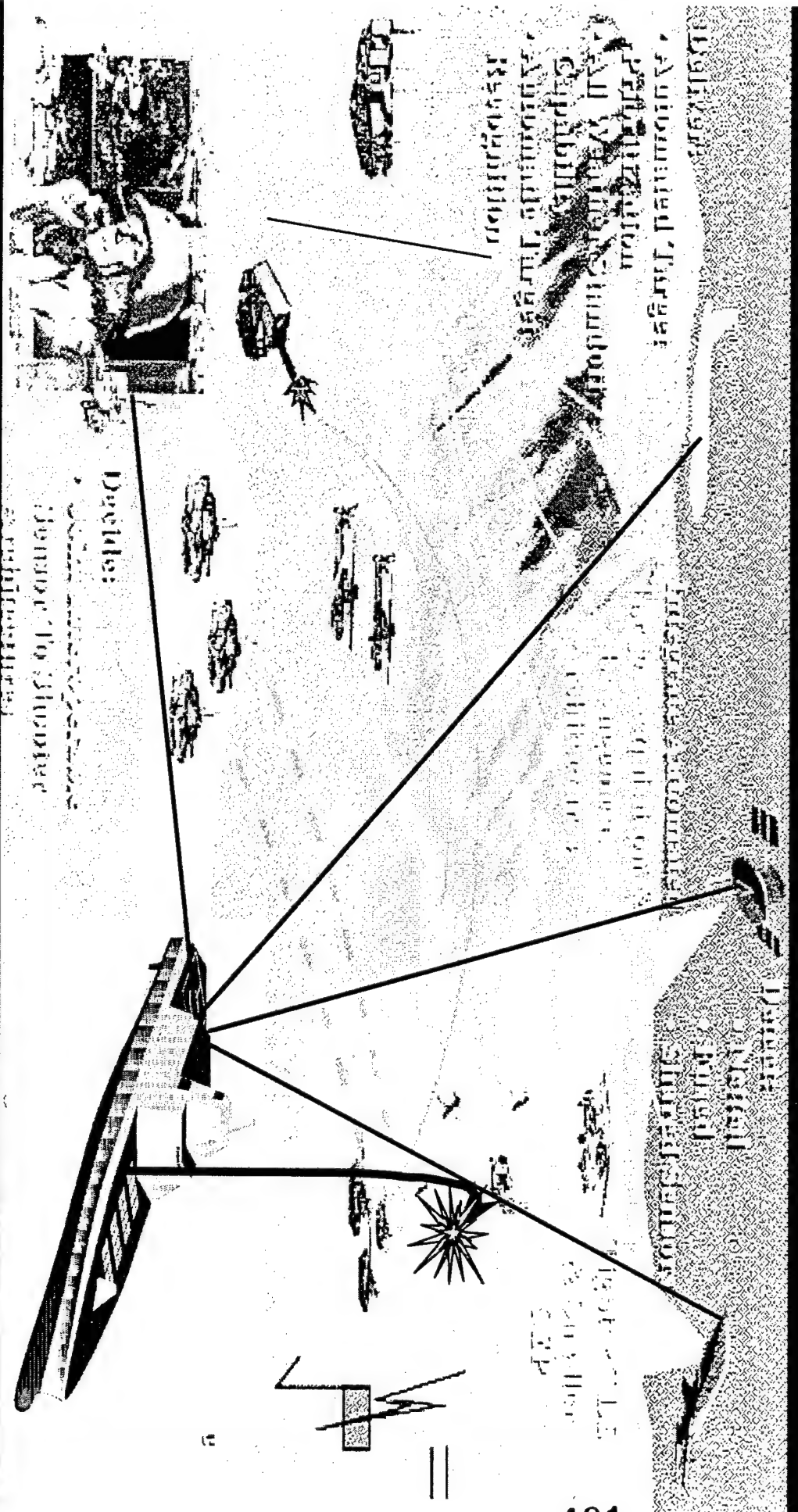


# Knowledge Engineering



*Correlated, filtered, relevant*

# DD 21 for Expeditionary Warfare



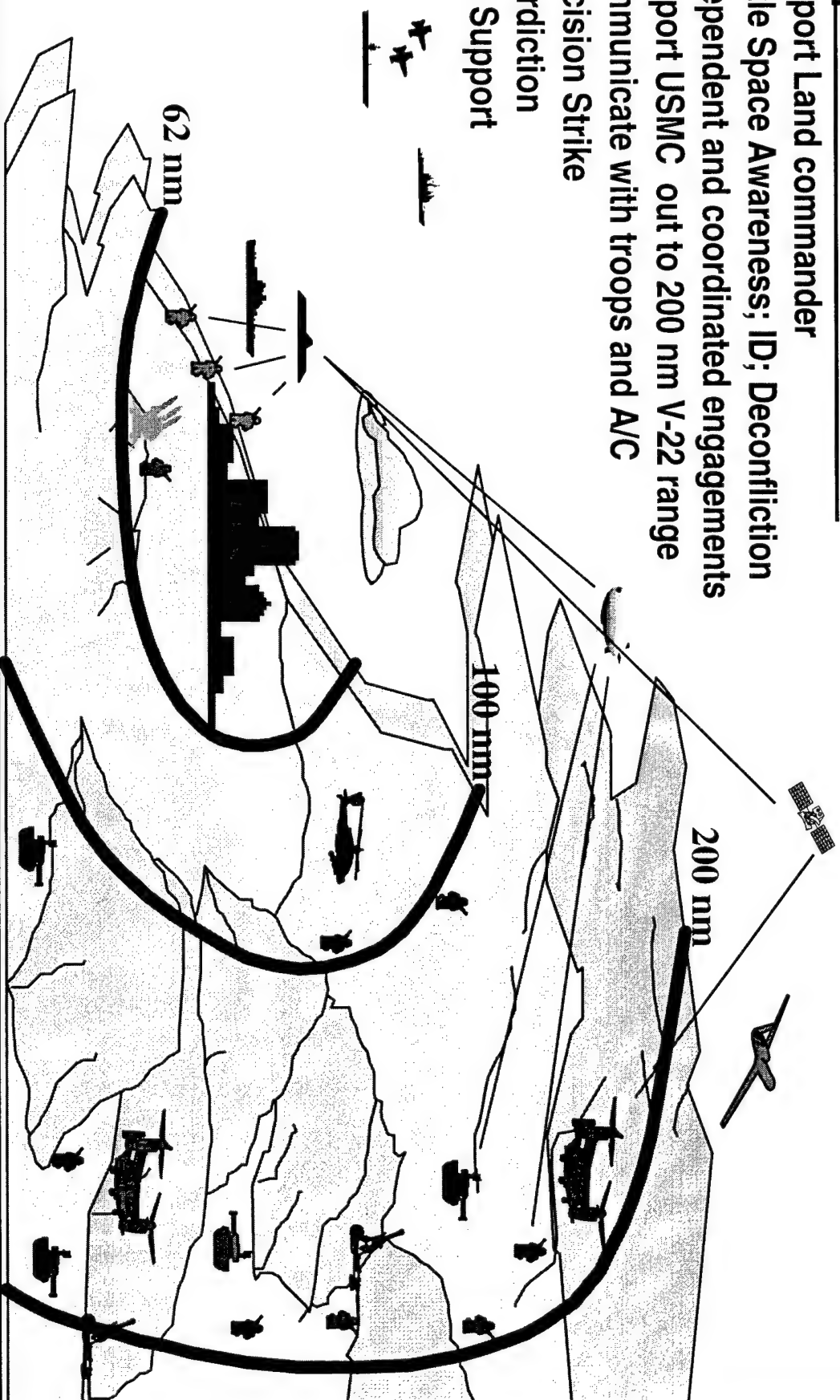
# *Backup*

---

# DD 21 Land Attack Imperatives

## Operational Considerations

- ◆ Support Land commander
- ◆ Battle Space Awareness; ID; Deconfliction
- ◆ Independent and coordinated engagements
- ◆ Support USMC out to 200 nm V-22 range
- ◆ Communicate with troops and A/C
- ◆ Precision Strike
- ◆ Interdiction
- ◆ Fire Support



# Information Superiority Metrics

---

- ◆ **Quantity**
  - Numbers of threats or targets in a specified period
  - Size of coverage area
- ◆ **Quality**
  - What degree of geo-location accuracy is required?
  - What degree of spatial accuracy is required?
  - What degree of spectral accuracy is required
- ◆ **Timeliness**
  - How quickly must a target be located and identified?
  - How quickly must information be provided for effective action?
  - How often must be updated once initial information is provided?
- ◆ **Assuredness: under what conditions must information be acquired?**  
(e.g. Time of day, weather, jamming)
- ◆ **Robustness: what kind of failure rate can be tolerated?**
- ◆ **Flexibility and scalability**
  - Time required to shift target or threat area.
  - Area of weapon dispersion
  - Variation in rate of anticipated operations, e.g. surge capacity



# **Marine Fires for the 21st Century**

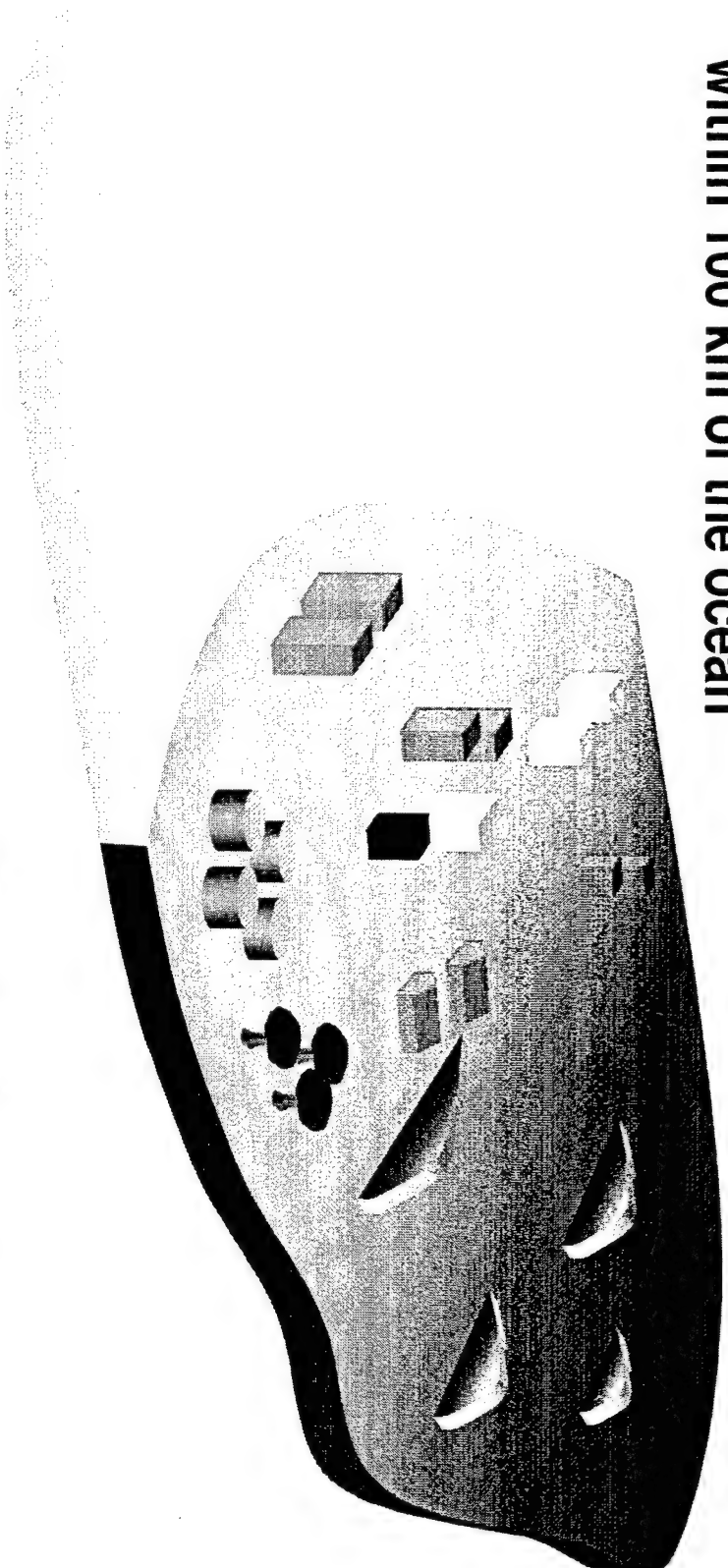
**Colonel Lynn A. Stuart**

**Commanding Officer, Marine Corps Artillery Detachment  
Fort Sill, Oklahoma**



# **The 21st Century Environment**

**Majority of world population  
within 100 km of the ocean**



**Majority of world  
urban in nature**

## Asymmetric Threats Against one or more of our Key Capabilities

## Asymmetric Threats Against one or more of our Key Capabilities



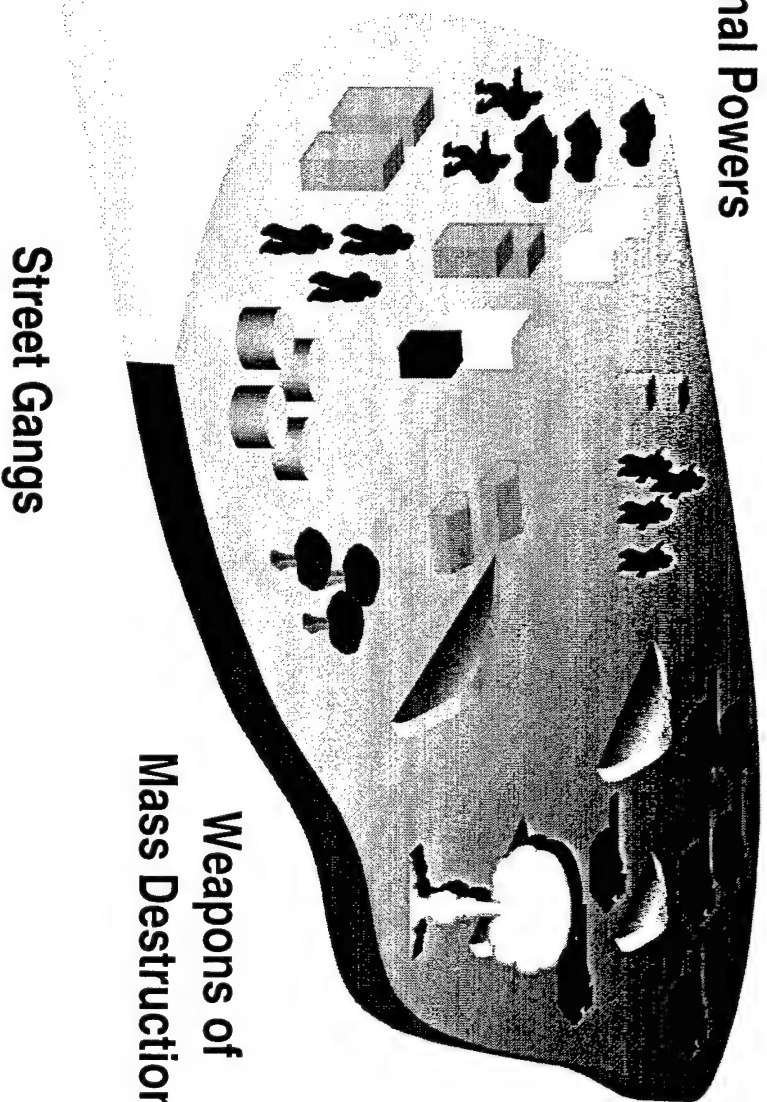
## Regional Powers



## Ethnic Groups



# Super Powers

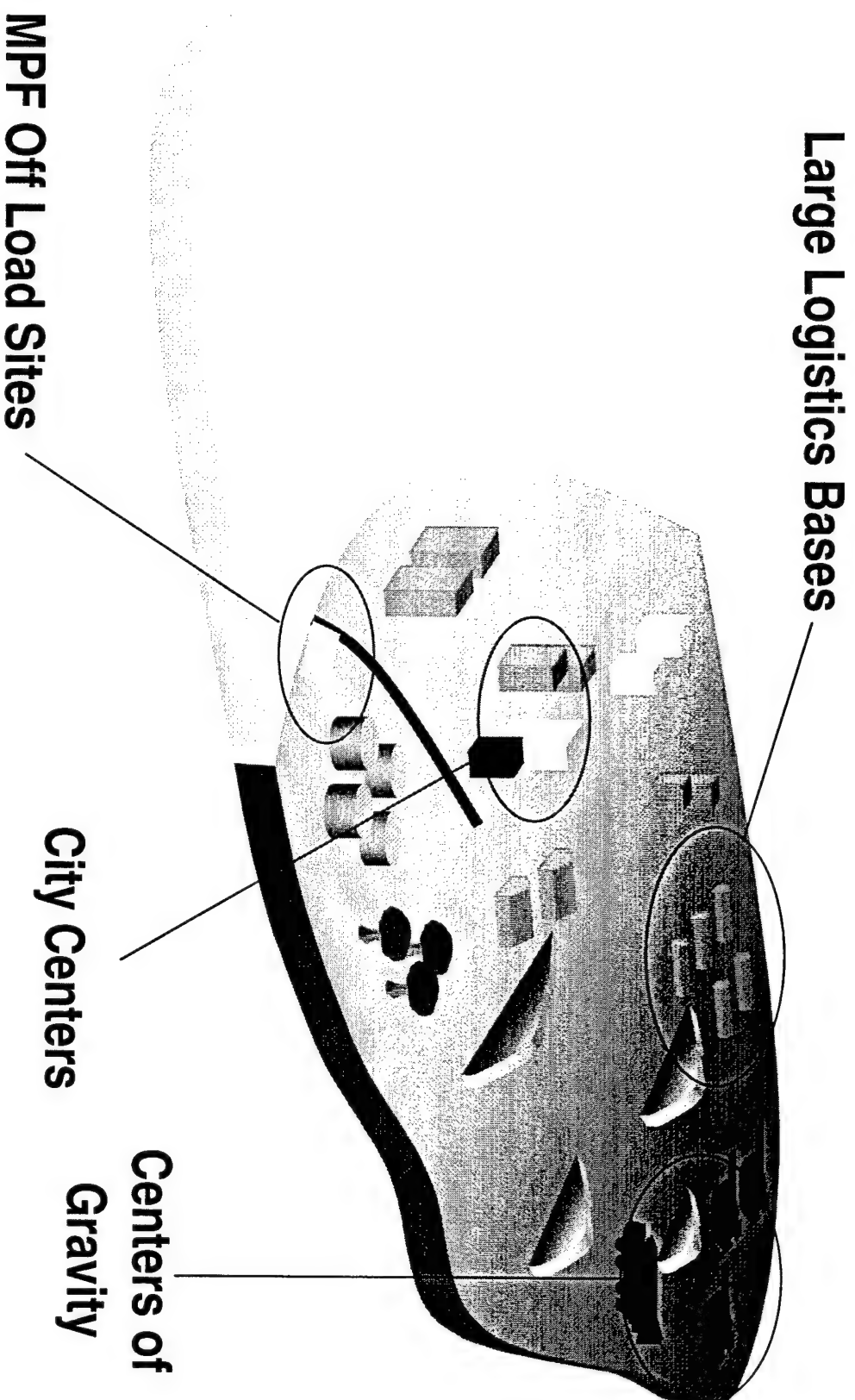


## Weapons of

# Mass Destruction

# Street Gangs

# Infrastructure of 20th Century Combat Power

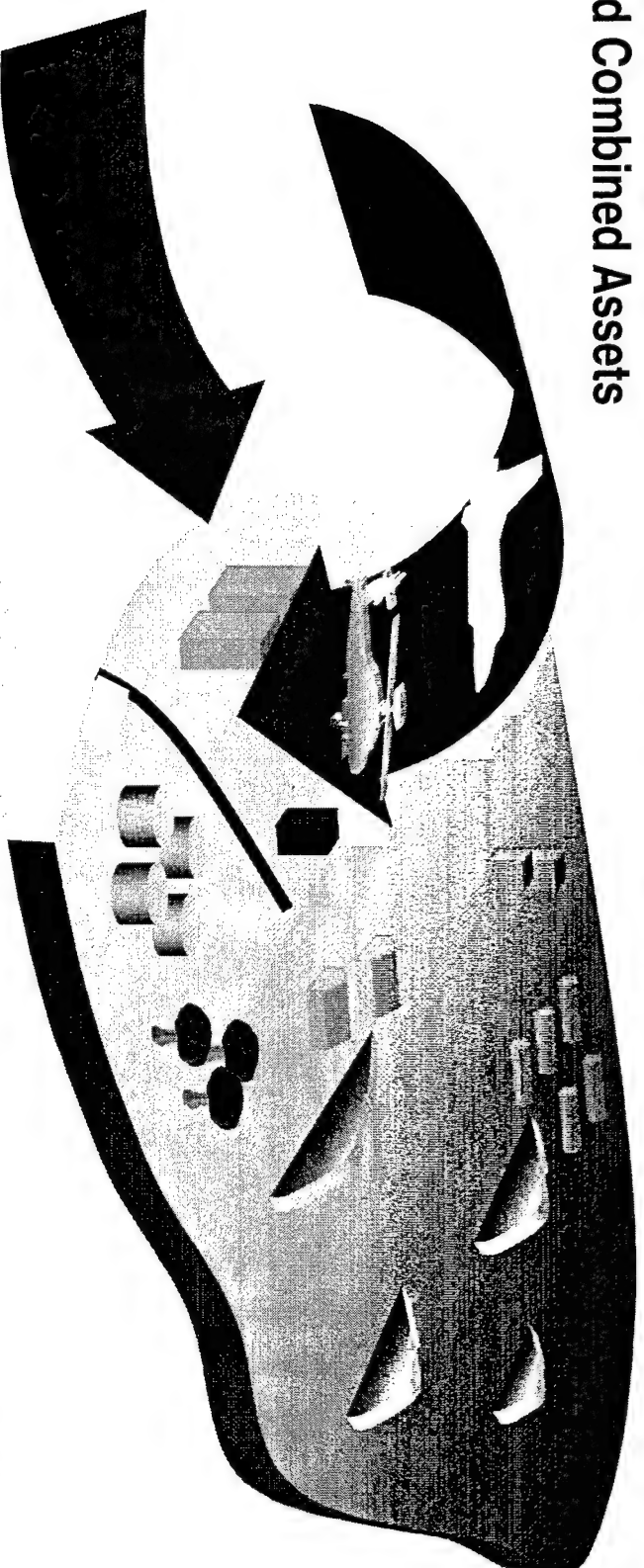


# Operational Maneuver From the Sea . . .

**Integrates Organic, Joint,  
and Combined Assets**

**Focuses on  
Operational Objective**

**Puts Strength  
Against Weakness**



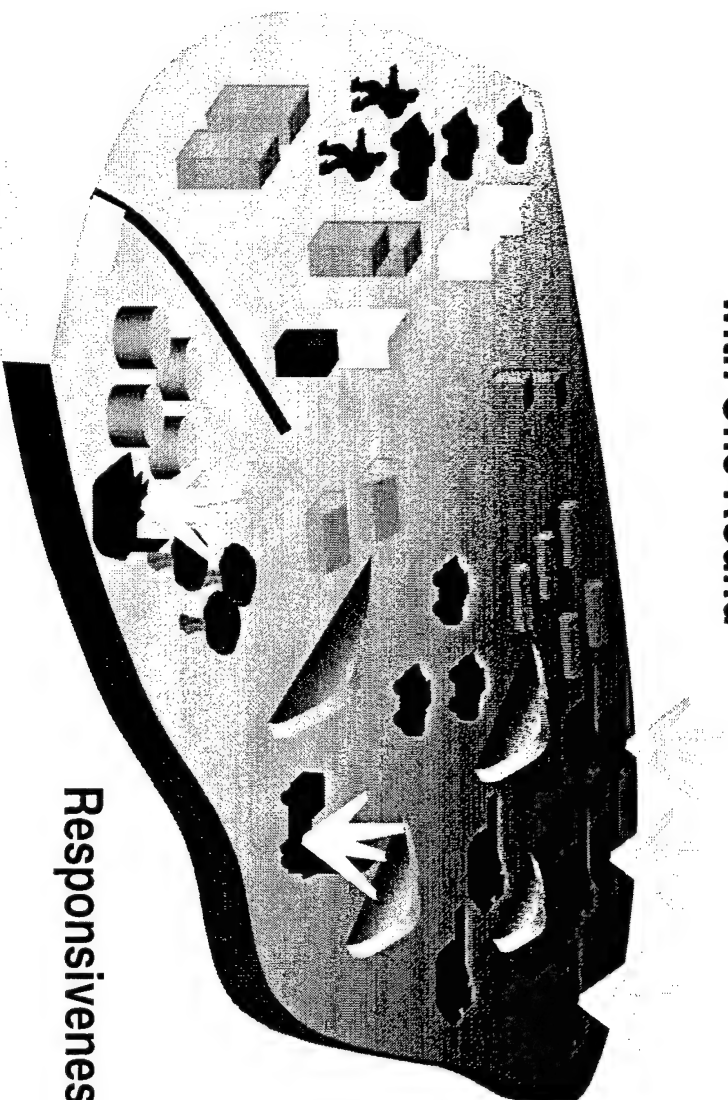
**Uses the Sea as  
Maneuver Space**

**Generates Overwhelming  
Momentum and Tempo**

**. . . Marriage of Maneuver and Naval Warfare**

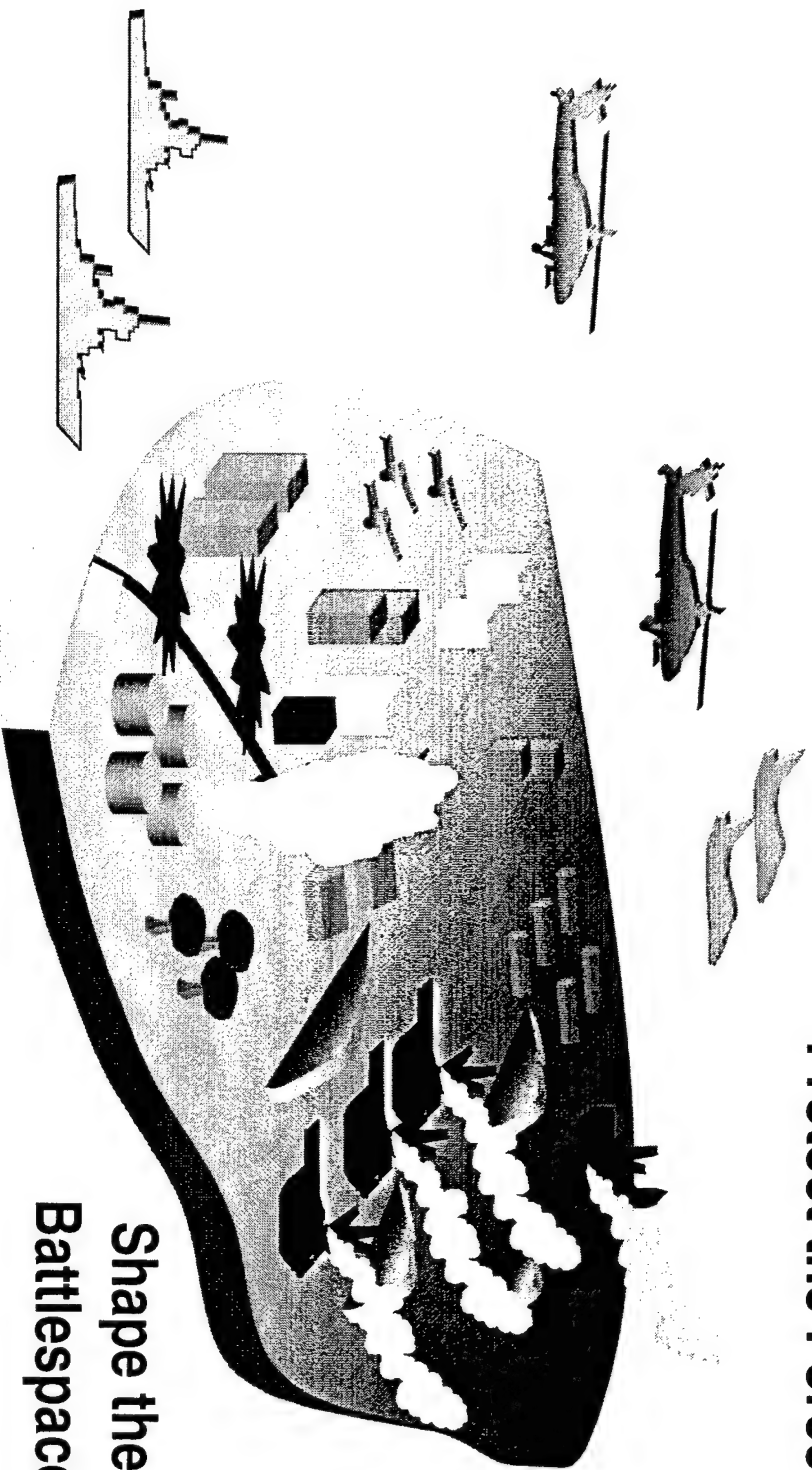
# OMFTS from a Fires Perspective

Multiple Targets  
with One Round



# The Contribution of Fires

Protect the Force



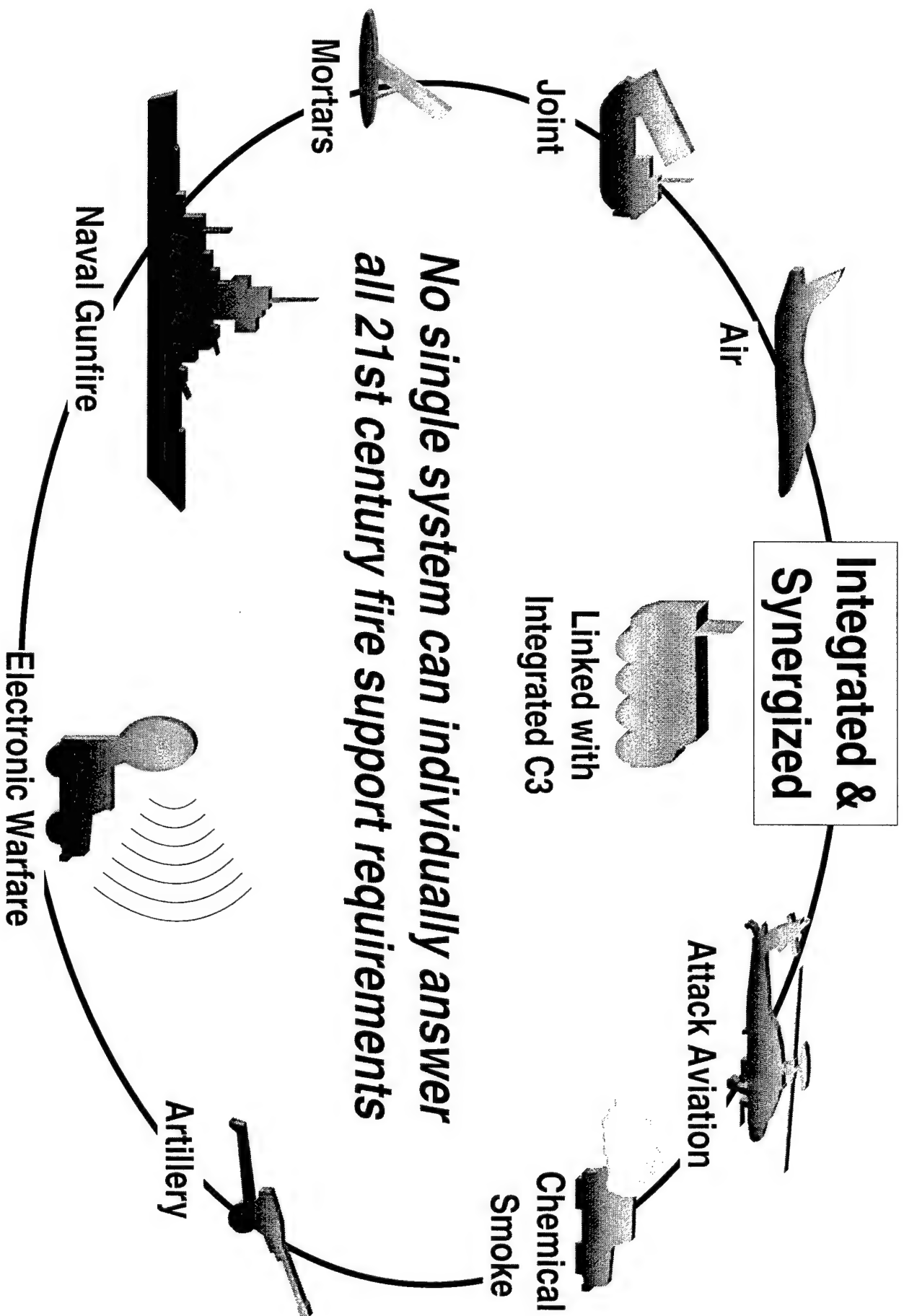
Shape the  
Battlespace

Facilitate

Entry Operations



# Fires Systems for the 21st Century



# 21st Century Fires Platforms



**Fixed & Rotary Wing  
Systems**



**Space Based  
Systems**



**Advanced Technology  
Light Artillery System**



**High Mobility  
Artillery Rocket System**



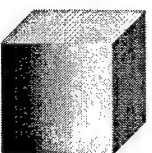
**Dragonfire**



**XM 777**

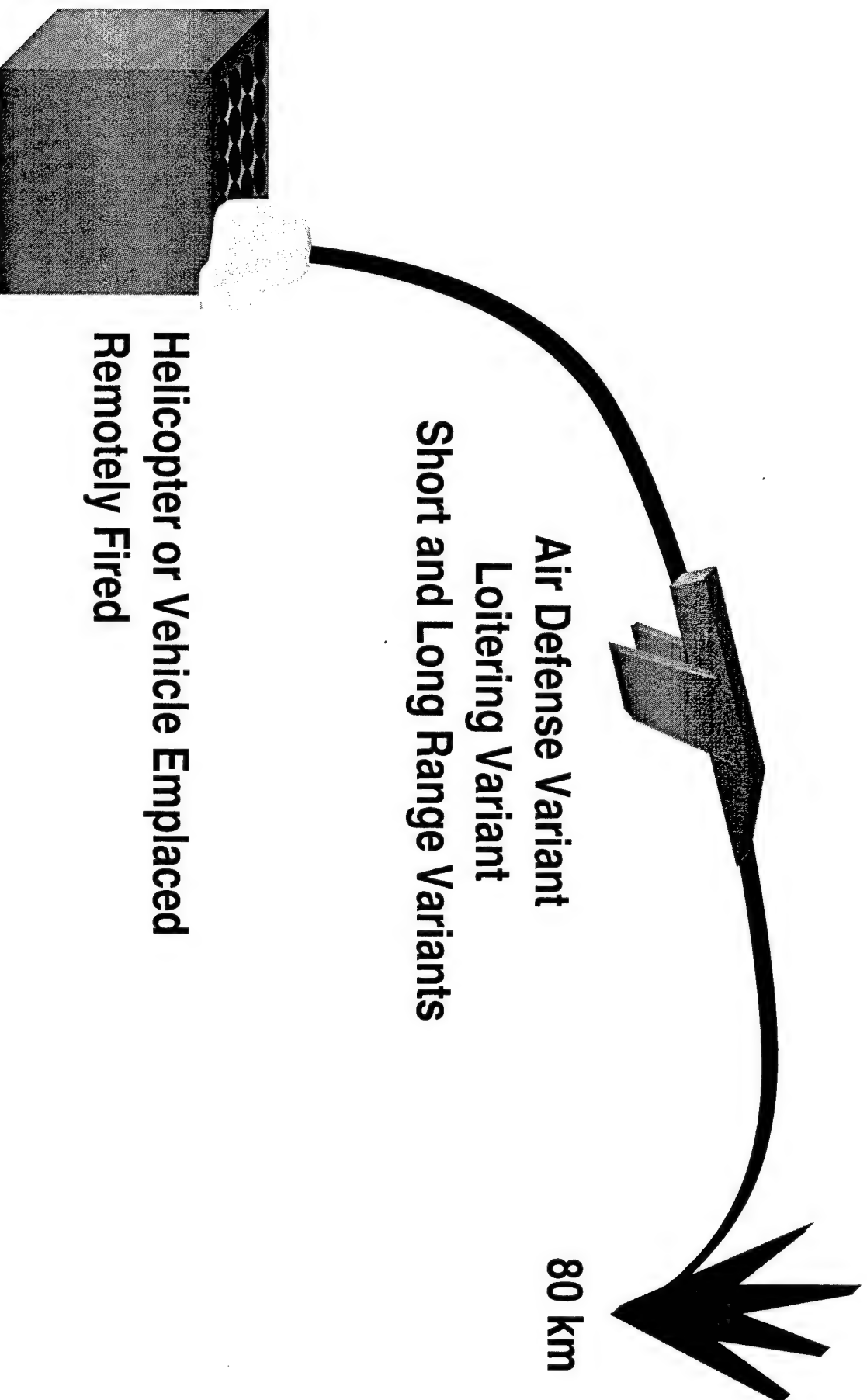


**DD-XXI**



**Advanced Fire  
Support System**

# Advanced Fire Support System



# Target Acquisition



JSTARS



National Assets



Fixed & Rotary Wing Aircraft



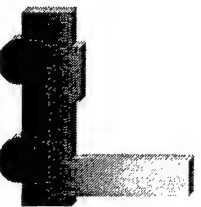
UAVs



DD-XXI



Remote Sensors



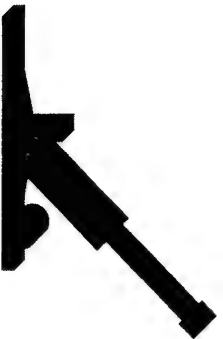
250+ km Counter Battery Radar



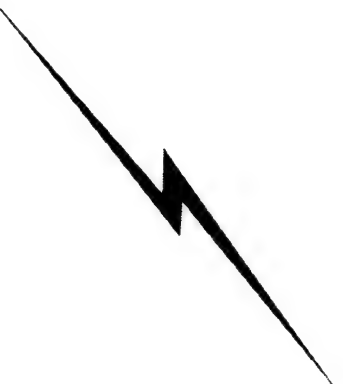
Lightweight Designators



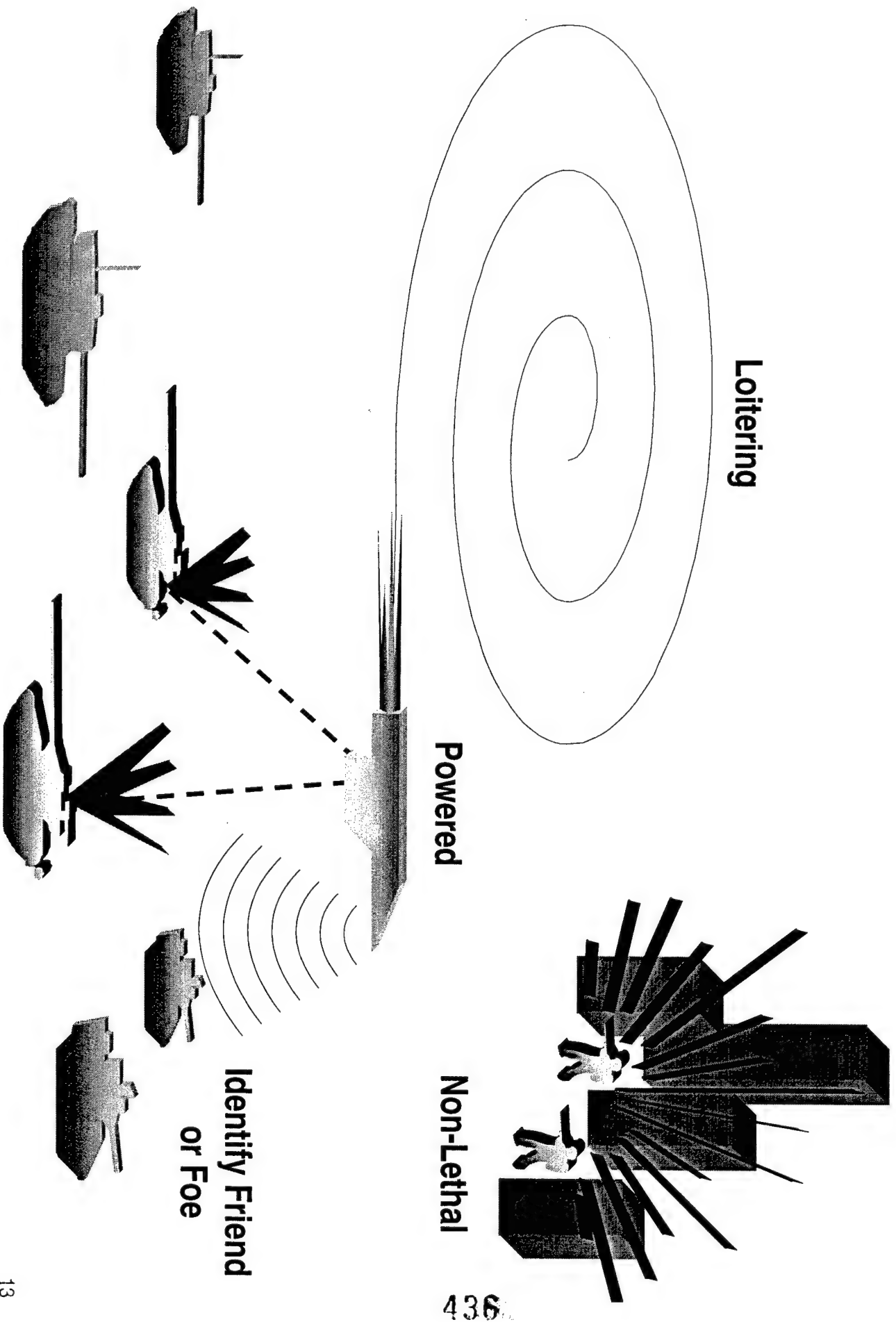
Mobile Ground Target Radars



Sensor to Shooter Links



# Munitions . . . The Future of Fires



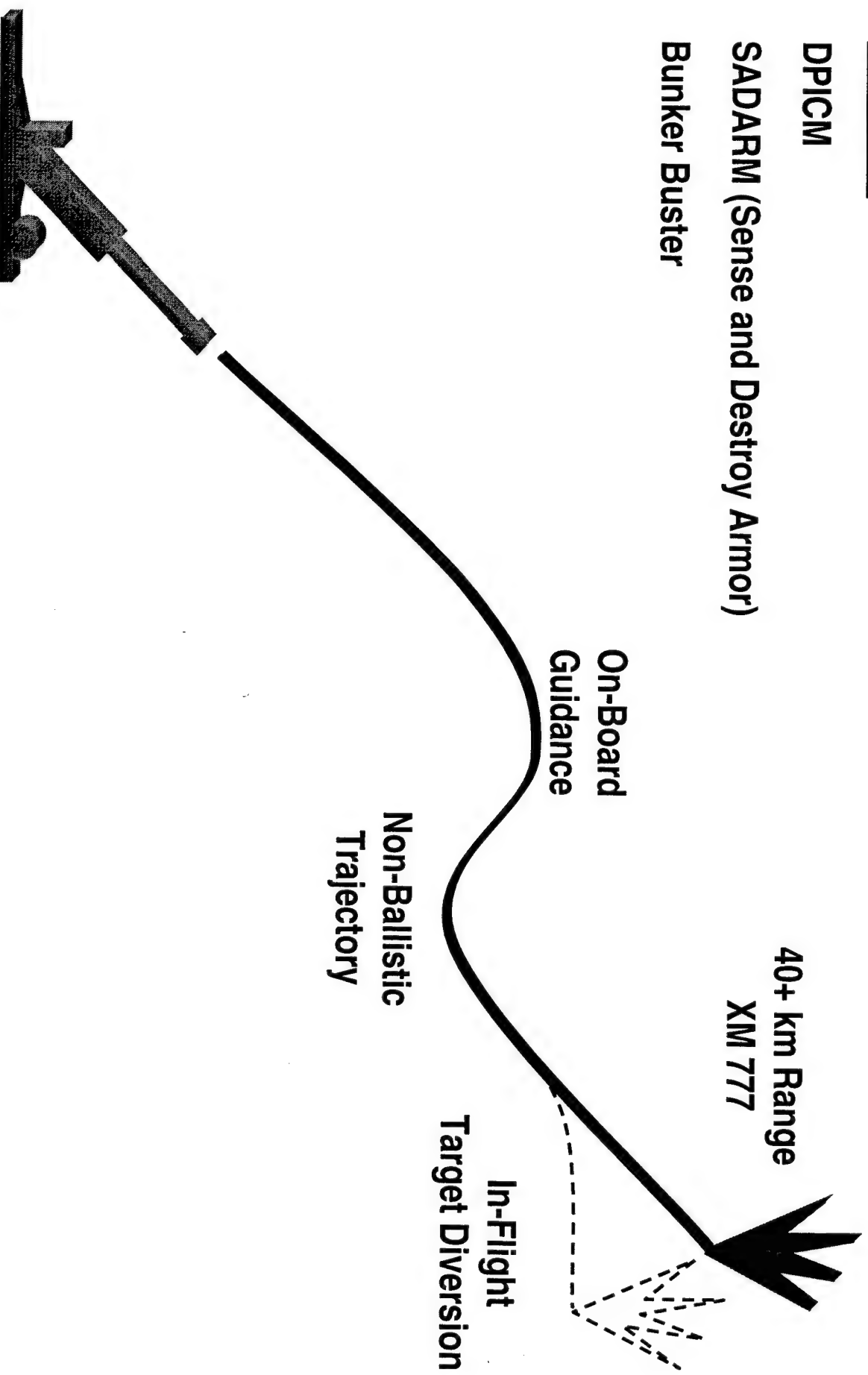
# Extended Range Guided Munitions

## Warheads

DPICM

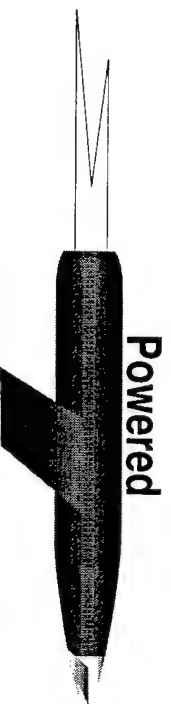
SADARM (Sense and Destroy Armor)

Bunker Buster

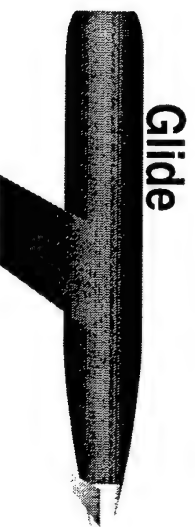




# Munitions Development



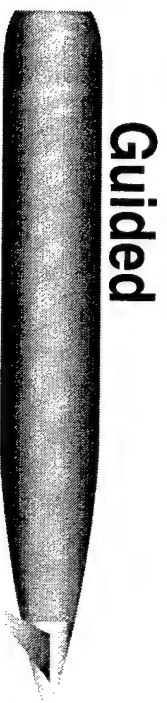
*Lighter, More Lethal  
Platforms*



Long Ranges  
Lighter Platforms



Extended Ranges  
Reduced Ammo Weight

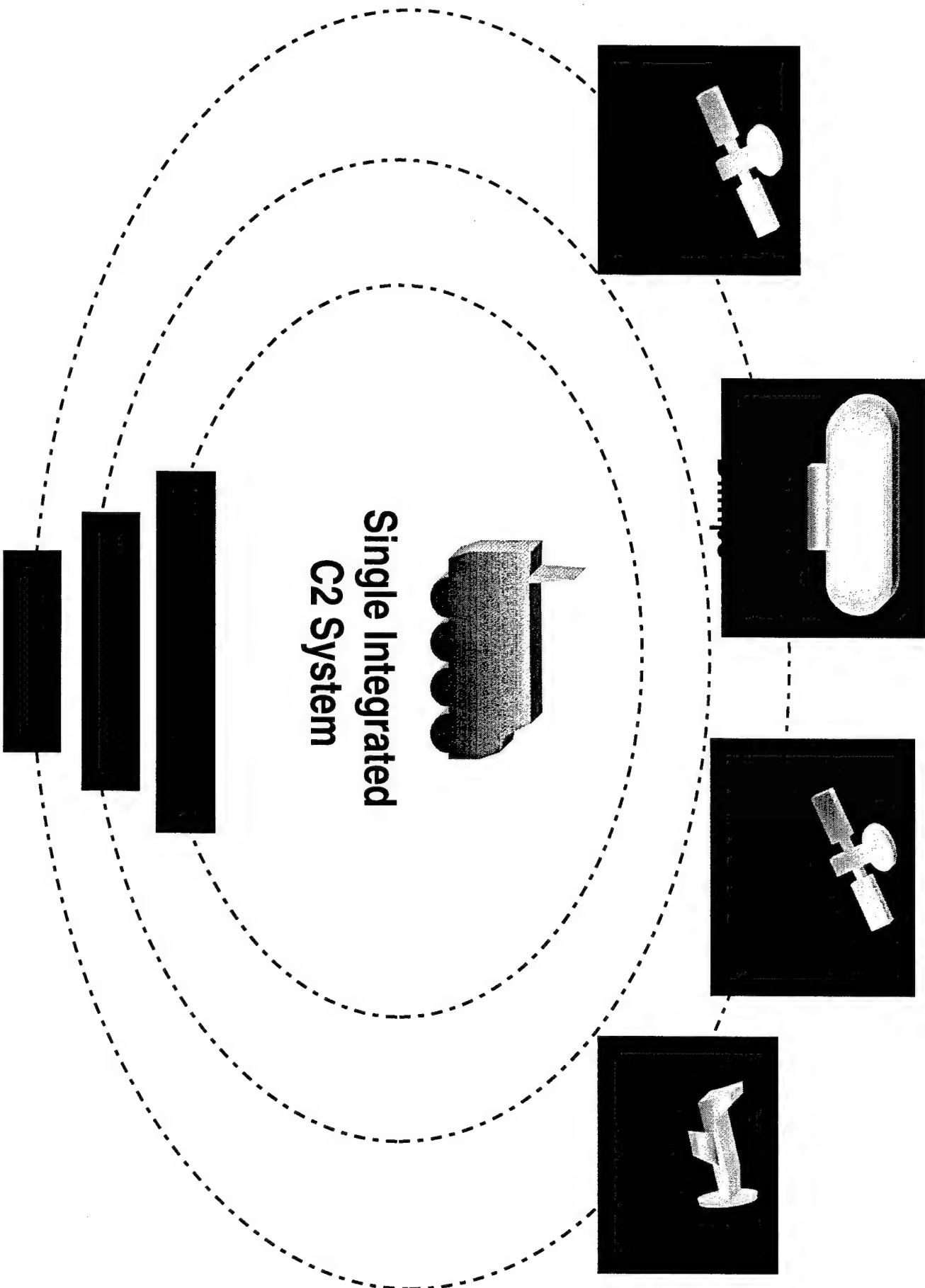


Enhanced Lethality  
Reduced Volumes



Large Volumes of Fire  
Heavy Platforms

# Command and Control

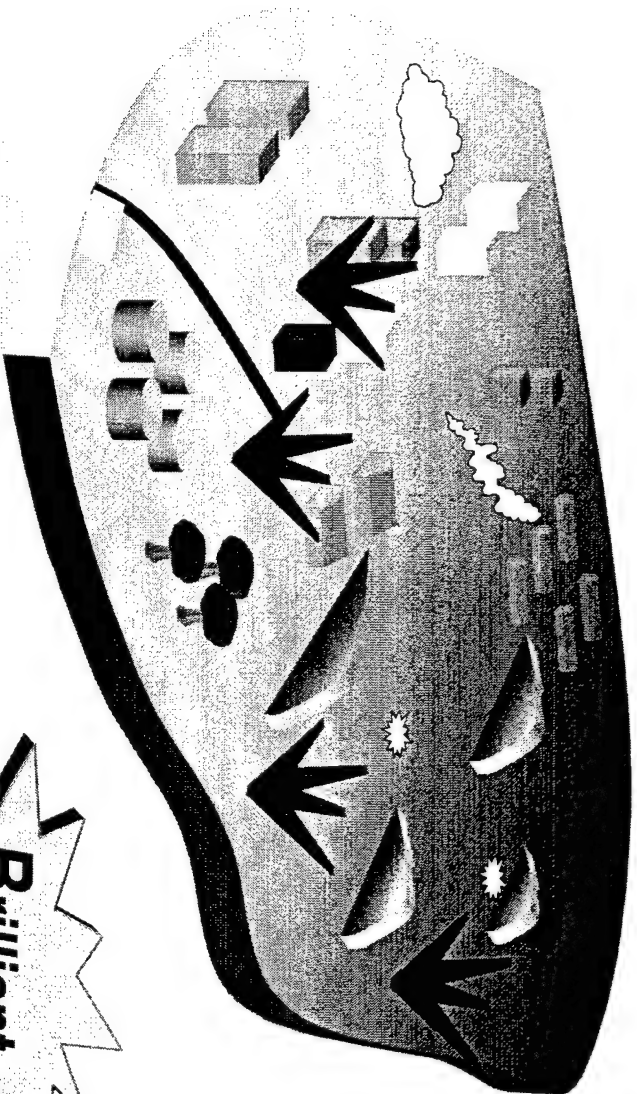


# Killing Fires for the 21st Century

Not Suppressing

Not Marking

Not Adjusting



**Brief**

**Bargain**

**Bloodless**

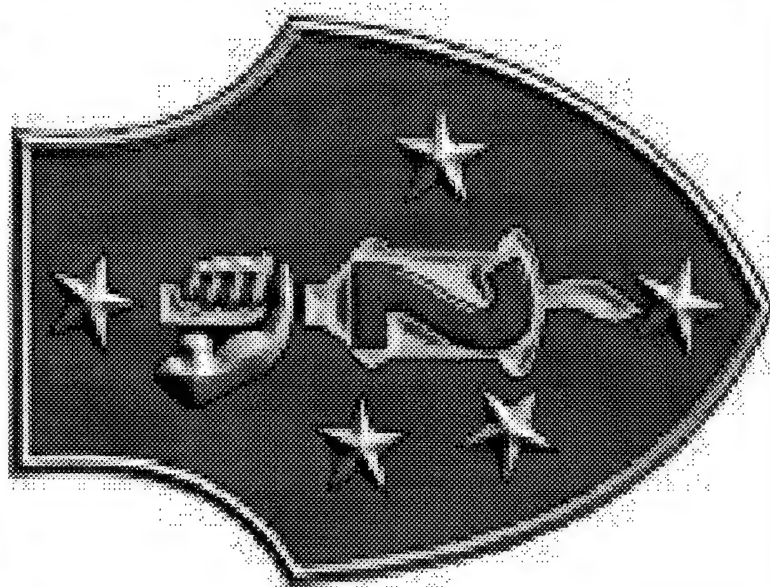
**Brilliant**

# The Ultimate Objective of Fires . . .



**Let them come home . . . Alive and Victorious**

# Expeditionary Warfare Conference

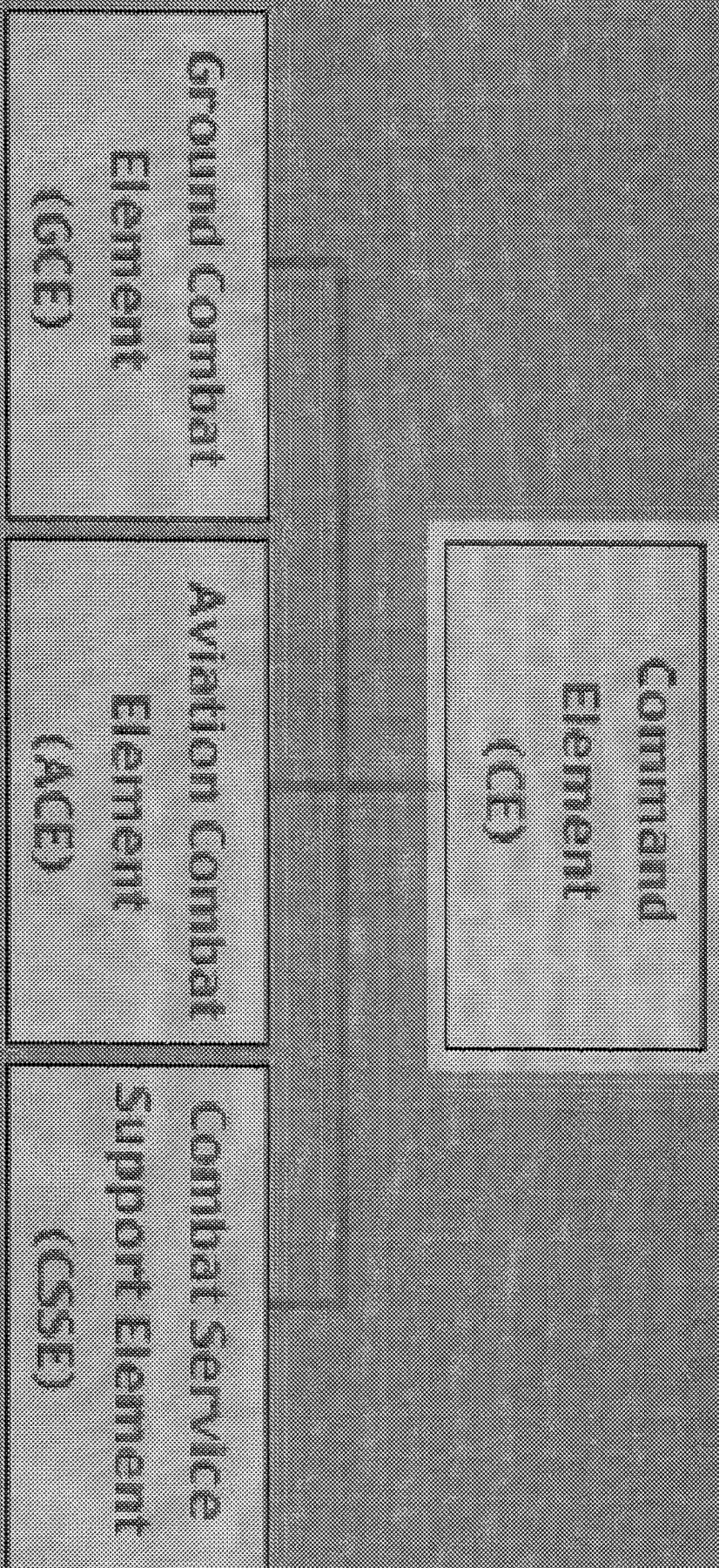
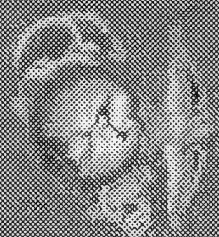


“Follow Me”





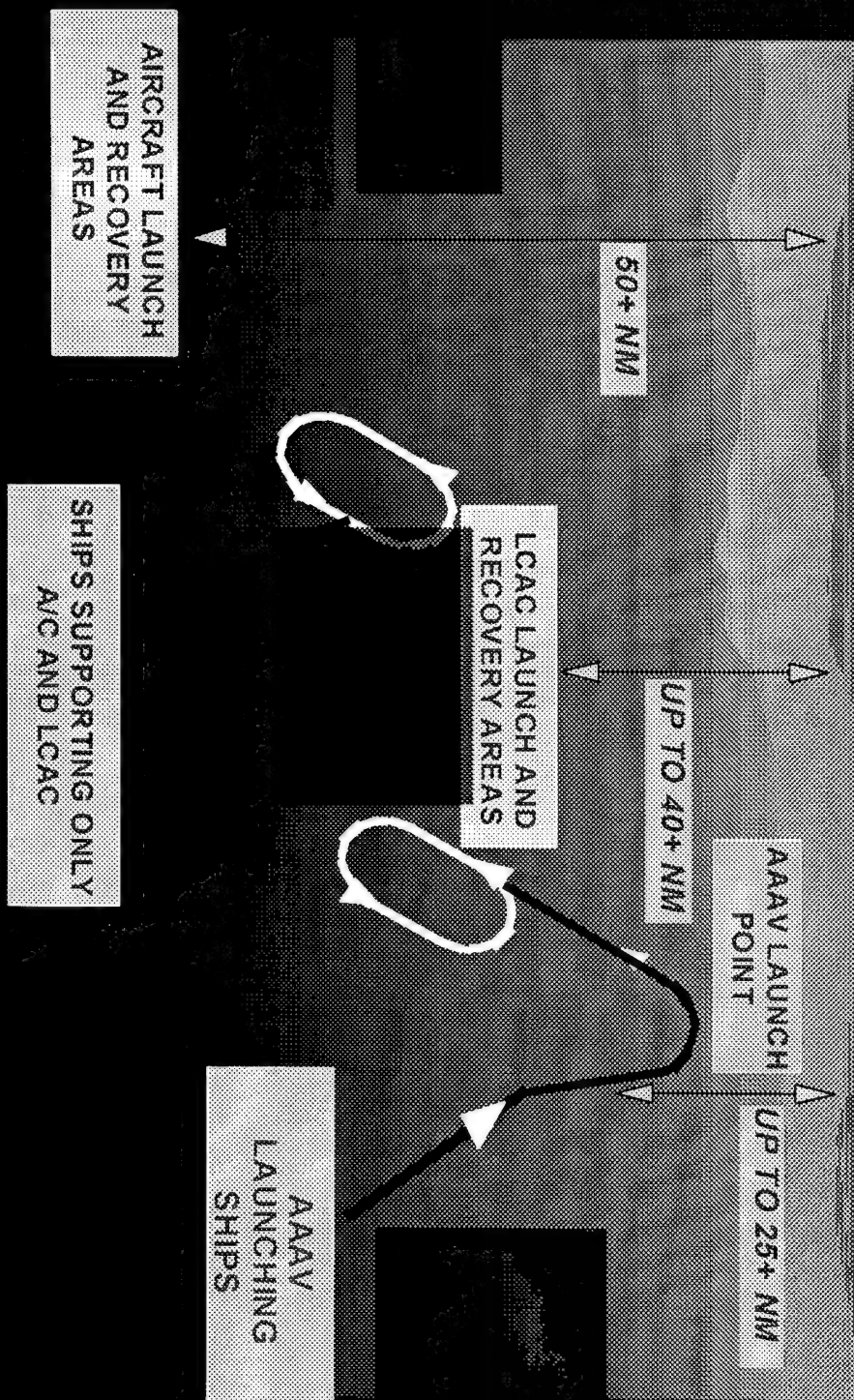
# Marine Air-Ground Task Forces (MAGTFs)

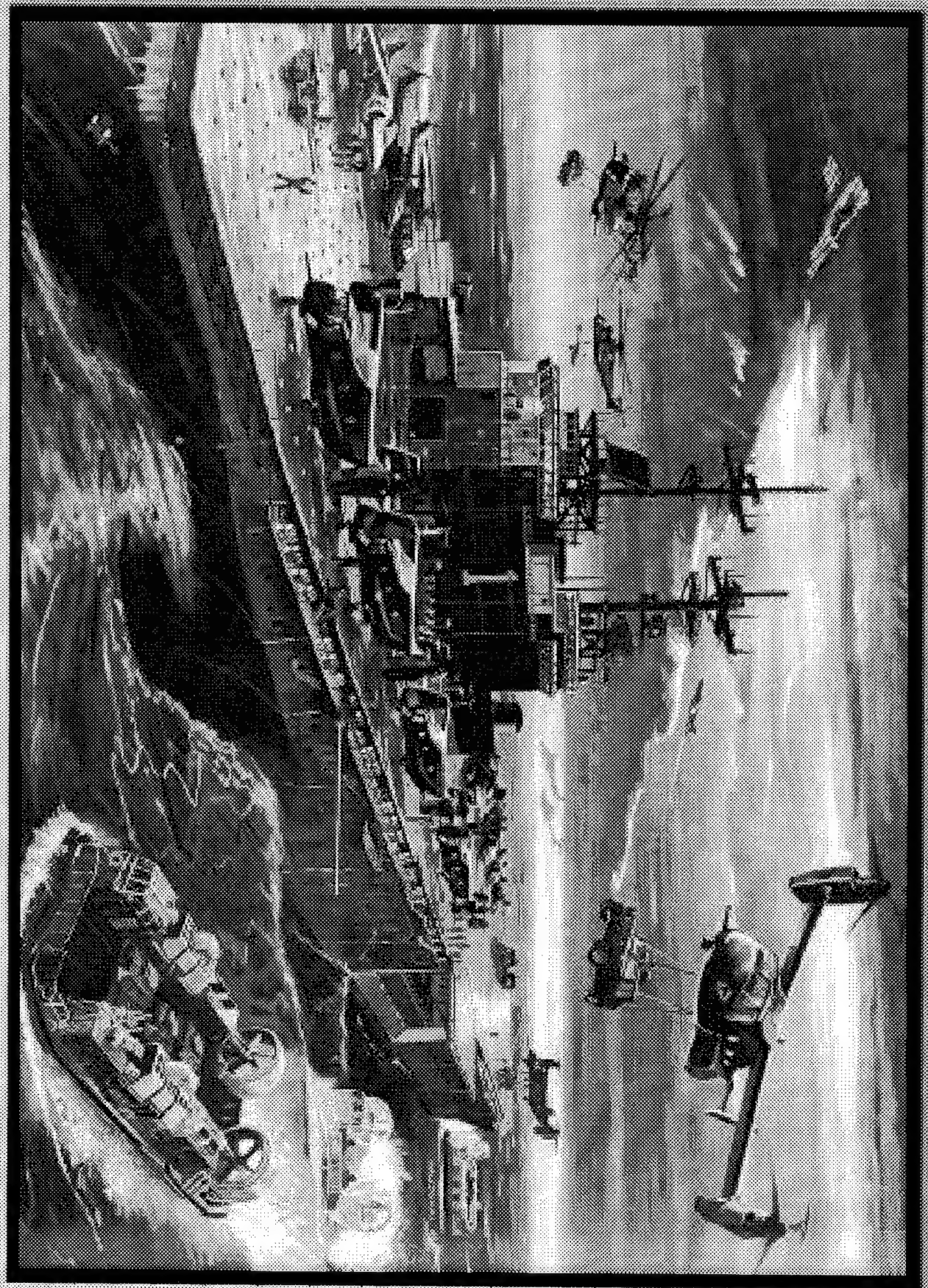




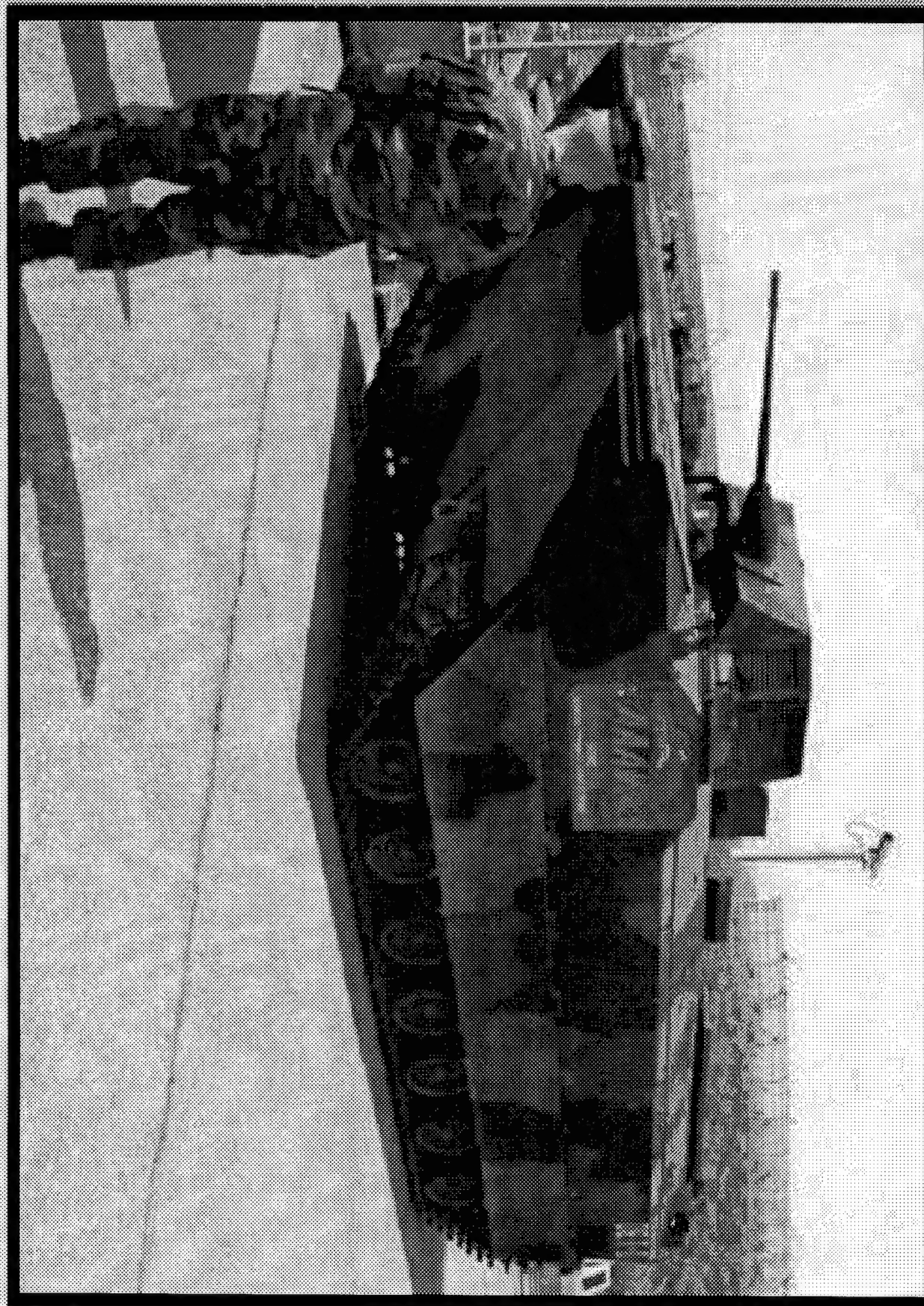


# MANEUVER WARFARE TO MARITIME OPERATIONS







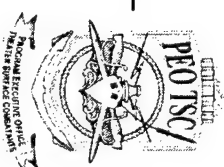


# Expeditionary Warfare Conference



“Follow Me”

# Naval Surface Fire Support 1998 NDIA



## 3rd Annual Expeditionary - Warfare Conference *NSFS Program Perspective, Progress and Plans*



RADM Michael G. Mullen  
Director, Surface Warfare (N86)

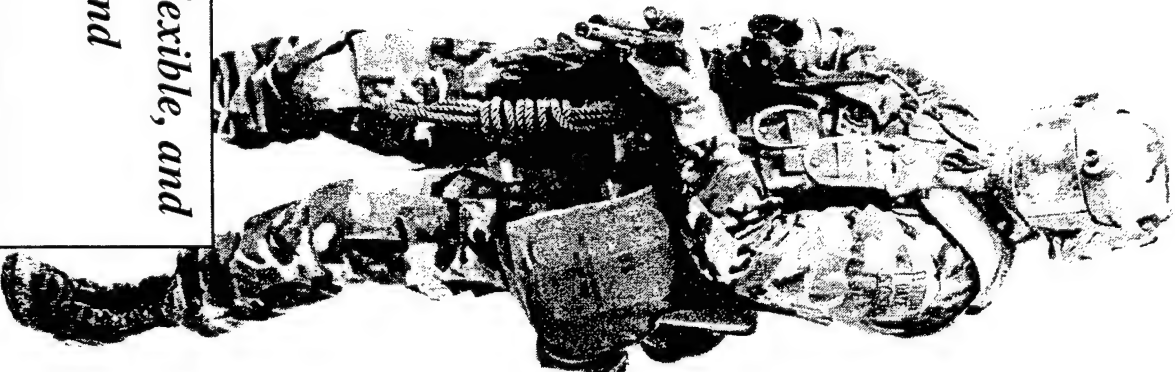
RADM David T. Hart  
Deputy Director Surface Warfare (N86B)

CAPT Ray C. Pilcher, Jr. (N864)  
Head Land Attack Warfare

CAPT Dennis G. Morral (PMS 429)  
NSFS Program Manager

5 November 1998

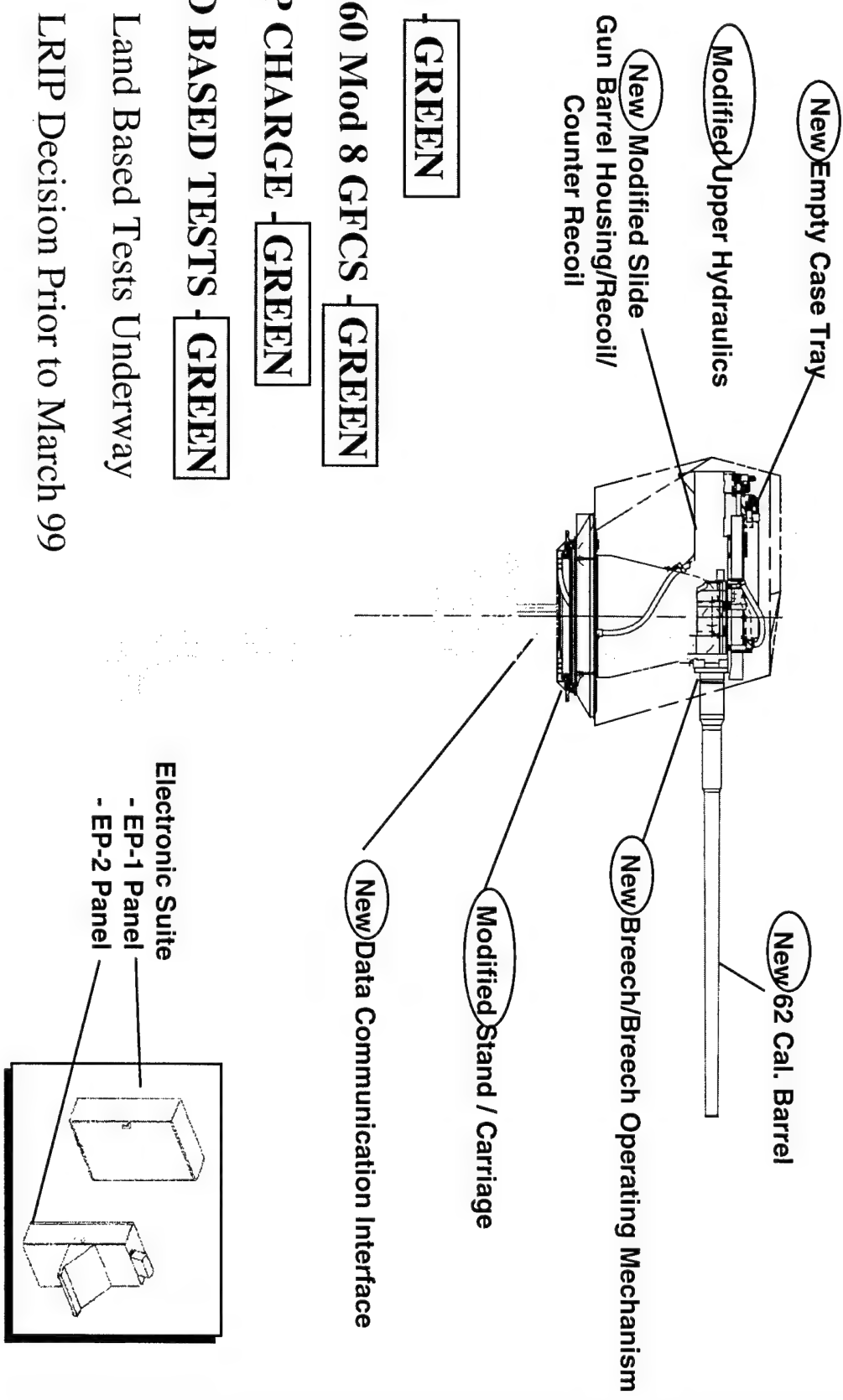
**MISSION STATEMENT:** “Design, build, and field a responsive, lethal, flexible, and affordable Naval Surface Fire Support Combat System that will meet the Land Warrior’s requirements by 2001.”





# NSFS MK 45 Modification

## AHEAD OF SCHEDULE



GUN - GREEN

MK 160 Mod 8 GFCS - GREEN

PROP CHARGE - GREEN

LAND BASED TESTS - GREEN

- » Land Based Tests Underway
- » LRIP Decision Prior to March 99

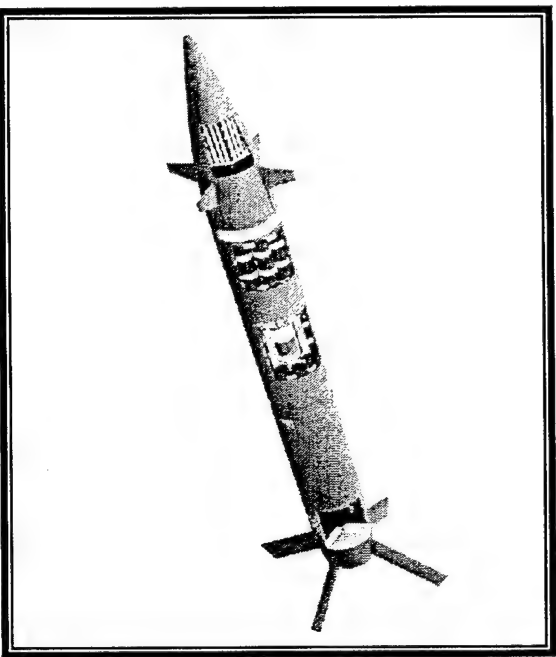
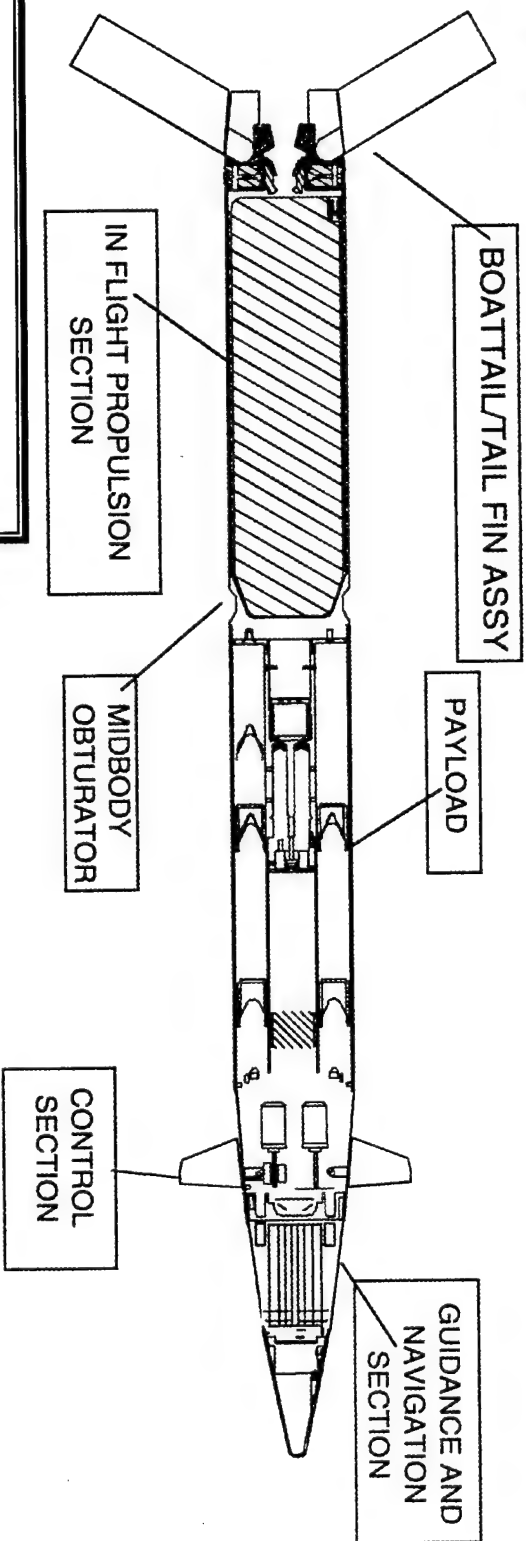
Naval Surface Fire Support

moraleview.ppt

11/20/98



# 5" / 62 ERGM Projectile



## Raytheon Systems Company

- GPS/INS Coupled Guidance and Navigation
- Rocket Assisted Projectile
- 72 M-80 DPICM Submunitions
- 10m - 20m CEP
- Time-of-Flight ~7 Minutes at 63nm

First Guided Flight of ERGM Scheduled for March 1999 at WSMR

*Naval Surface Fire Support*

mortalloreview@panama

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## What is the NFCS ?

- NFCS is a Naval Surface Fires Support Mission Planning System designed to employ Naval Surface Fire Support and interdiction tactical weapons...

... It is not a Fire Control System.

- NFCS is a computer program application that will receive targeting data, conduct Naval Surface Fires planning and coordination, and execute fire missions via interfaces to Weapon Control Systems.

- NFCS will be installed aboard DDG-81+, all CG-47 cruiser conversions and will be available to Amphibious Ships (LHA/LHD/LPD-17), Command Ships, and DD-21 should they choose to use it.

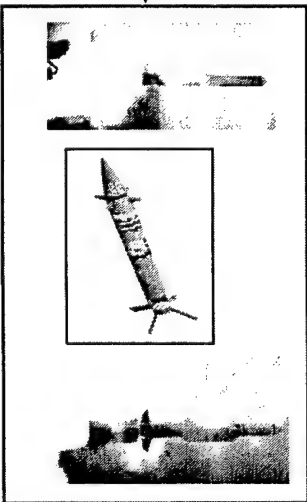
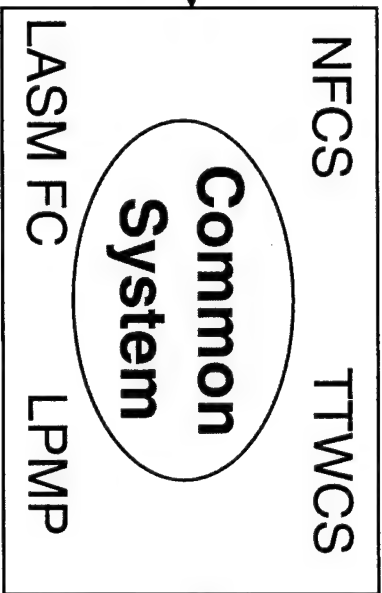
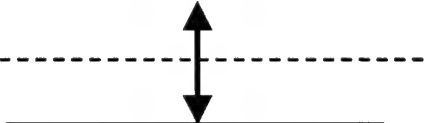
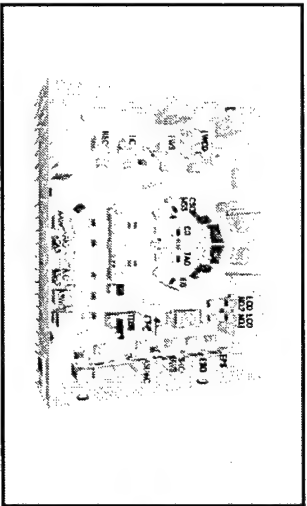


# Next Generation Land Attack System Vision

**Command and Decision**

**Control System**

**Weapon**



- Command and Control

- Land Tactical Display
- Naval Fires Planning
- Engagement Control
- Launch Platform Mission Planning

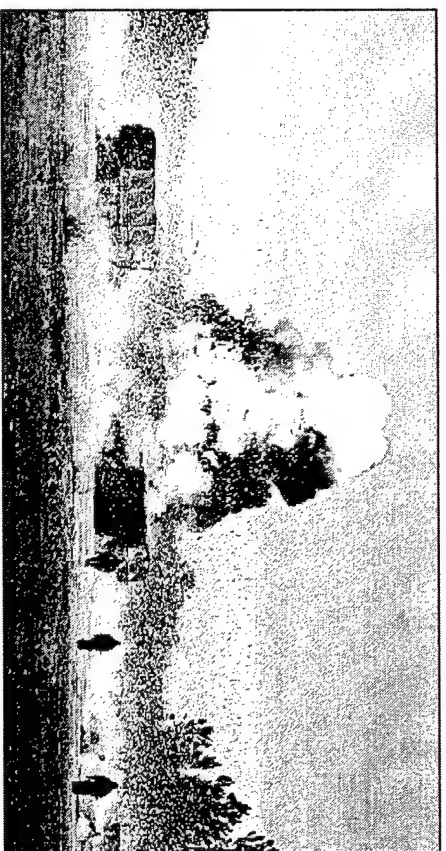
- Tactical Tomahawk
- ERGM (Extended Range Guided Missile)
- LASM (Launch Area Mission System)



# Land Attack Standard Missile

## Mission:

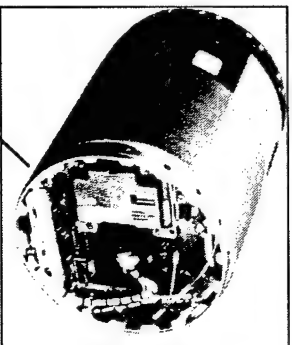
The Land Attack STANDARD Missile will provide the required range, lethality, responsiveness and accuracy needed to support Naval Surface Fire Support requirements for Operational Maneuvers From The Sea.



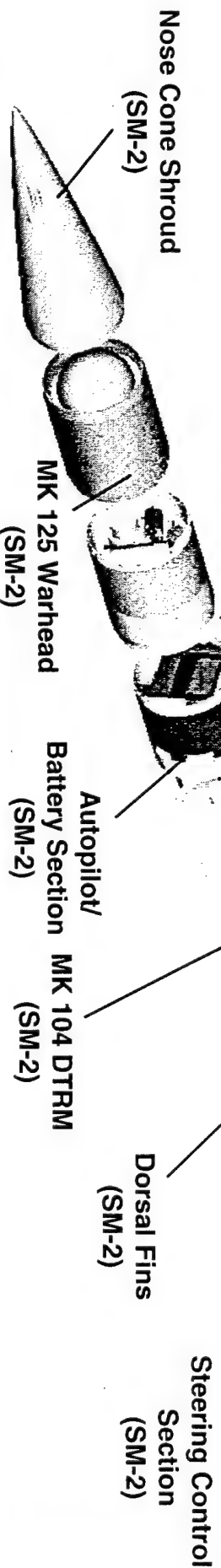
## - PROGRAM STATUS -

**GREEN**

**FY00 New Start -  
2003 IOC**



GPS/INS Guidance Section

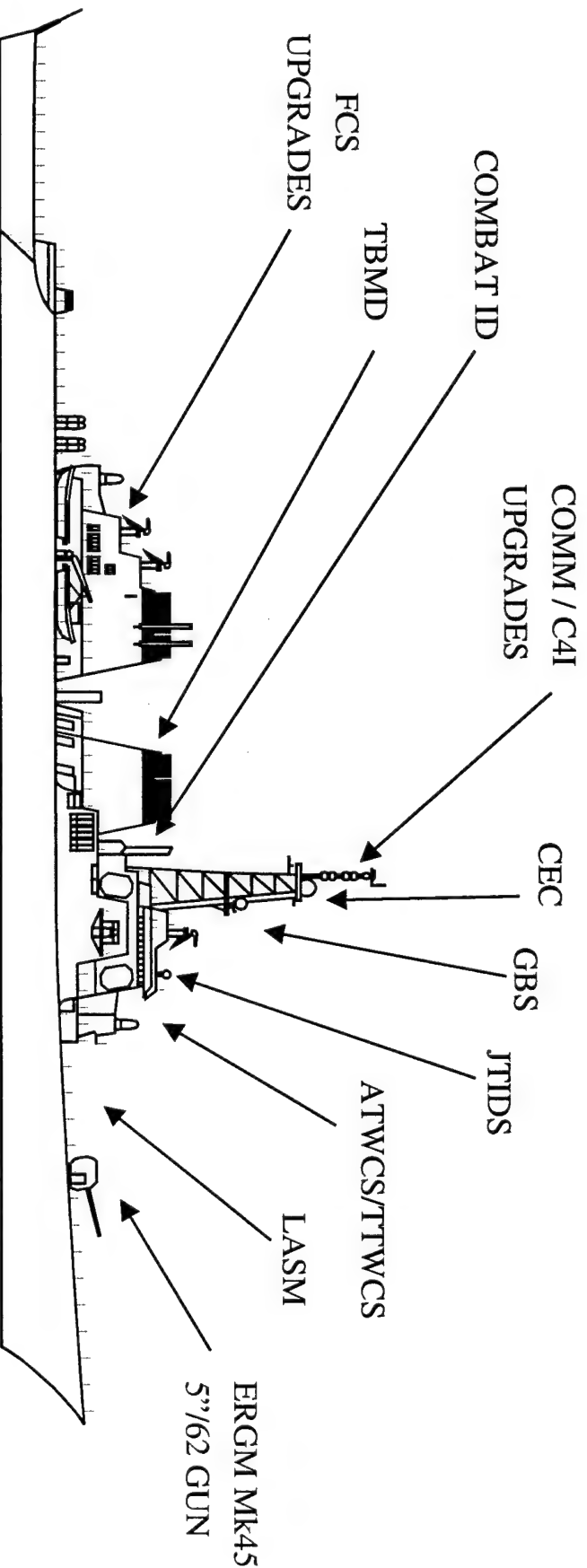


## Naval Surface Fire Support



## DDG Ship Integration

Quote from RADM Murphy Letter: "Every ship from DDG 81 on will have a Mod 4 gun."



Executing the Most Aggressive Mod 4 DDG Introduction Plan Conceivable

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Page 7



# CG Conversion

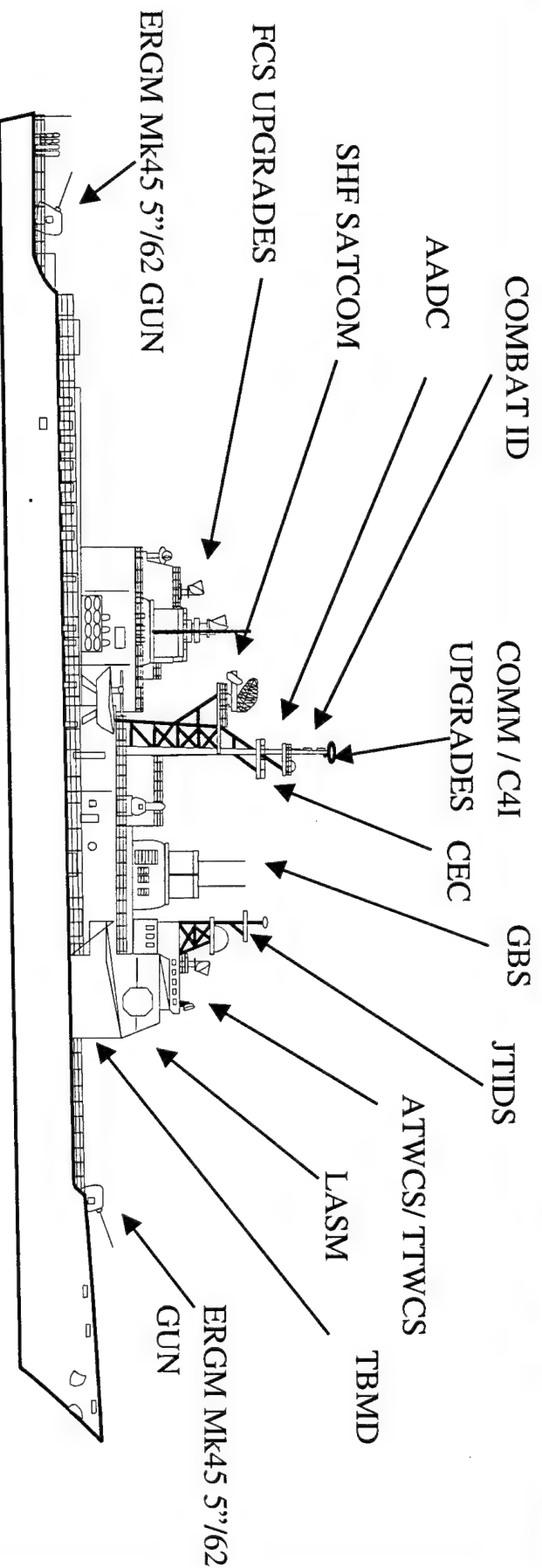
## PILLARS

### TBMD

### LAND ATTACK

### AADC

- ✦ Conversion of both guns from Mod 2 to Mod 4
- ✦ Structural Impact Analysis
- ✦ Install Mk 160 Mod (8+) GFCS (a two gun console system)
- ✦ Magazine reconfiguration for ERGM Storage and Handling assist System
- ✦ Naval Fires Control System (NFCS) configuration and integration
- ✦ LASM impact (VLS and Fire Control)



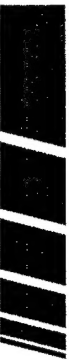
## Naval Surface Fire Support

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Page 8





# Advanced Guns To The Fleet

## 5"/62 (127mm) Guns:

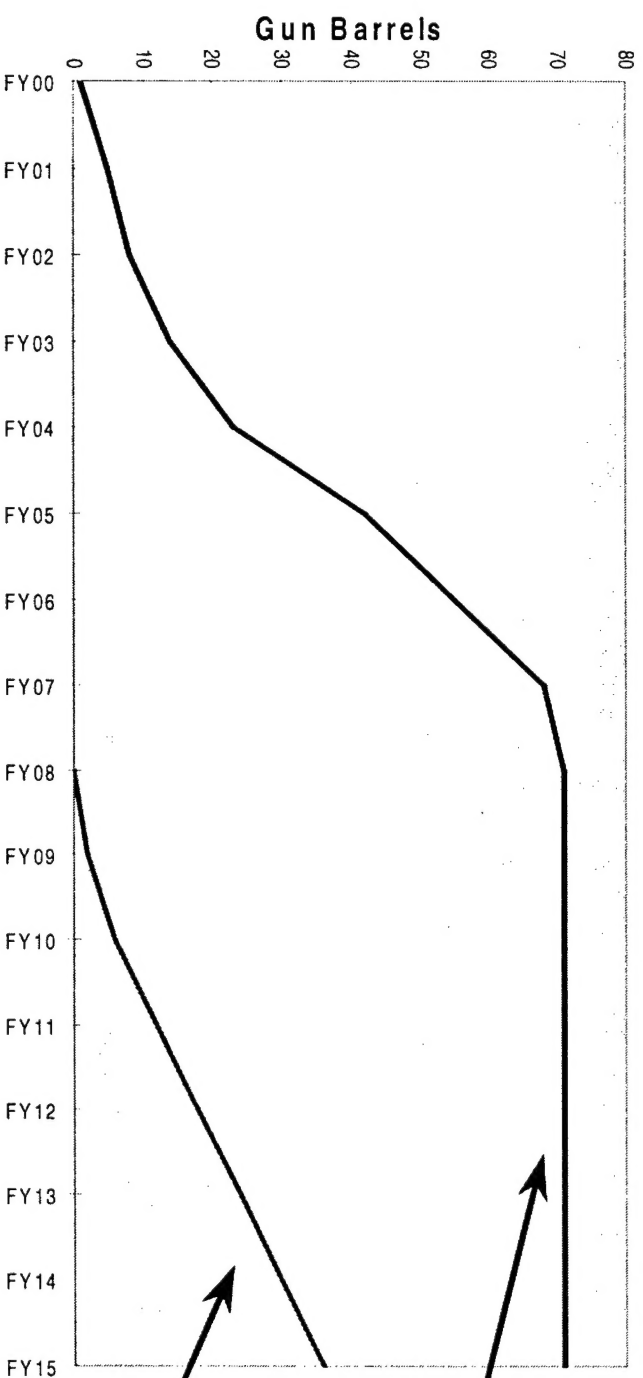
- DDG 81-107; (1 Barrel/Ship) - 27
- CG 52-73; (2 Barrel/Ship) - 22

## AGS (155mm):

- DD 21 (2 Barrels/Ship) - 32

## In Fleet 2015:

- 71 127mm Barrels
- 64 155mm Barrels





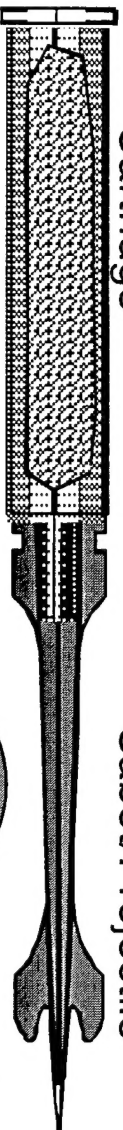
# Barrage Round

## Supports Marine Corps Requirement for Low Cost Volume Fire Round

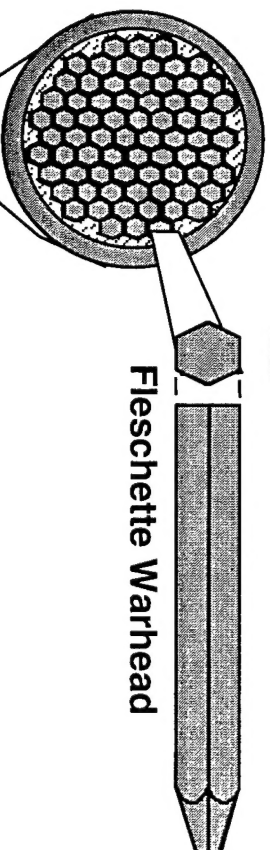
Cartridge

Single Ram

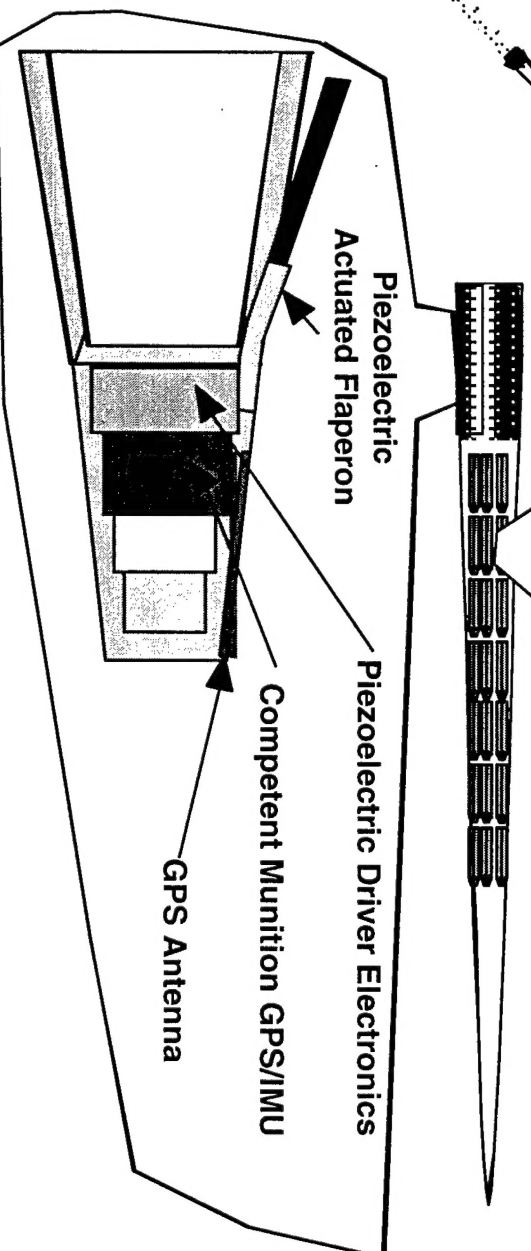
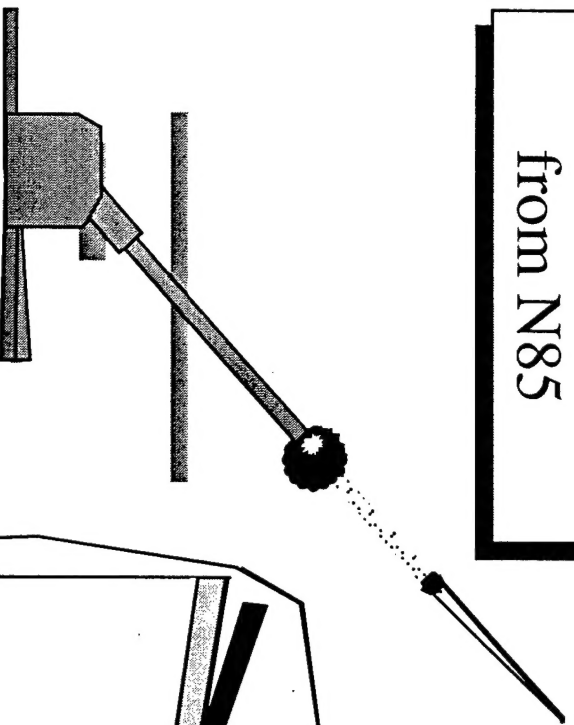
Sabot/Projectile



\$3M in FY99  
from N85



Flechette Warhead



Piezoelectric  
Actuated Flaperon

Piezoelectric Driver Electronics

Competent Munition GPS/IMU

GPS Antenna

Naval Surface Fire Support

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Page 10

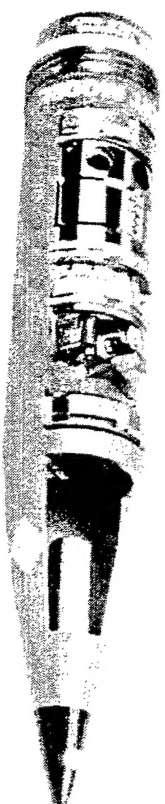
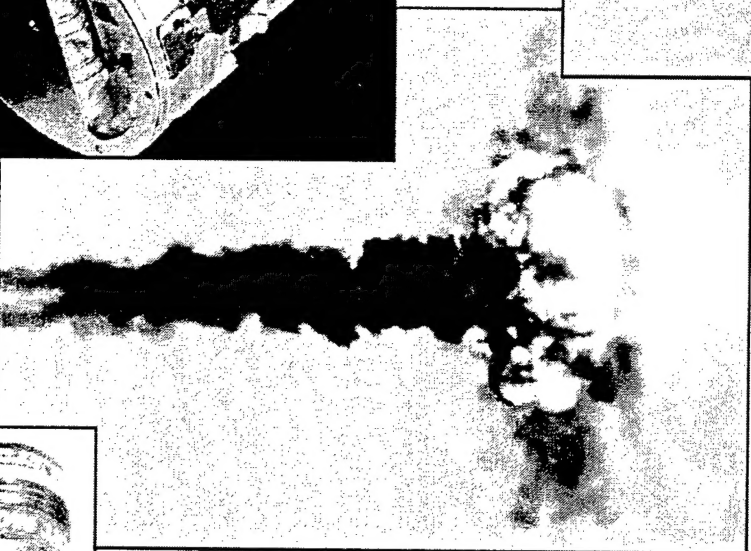
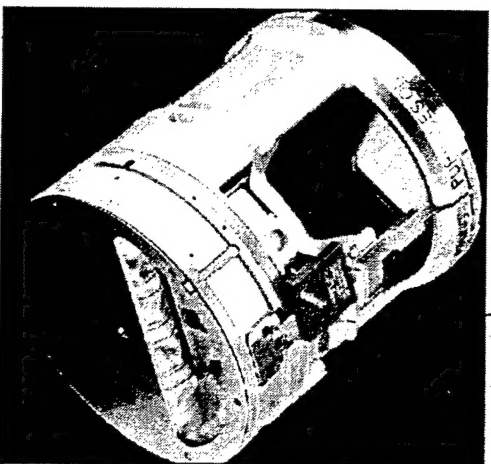
# Sense & Destroy Armor (SADARM)

Over \$850M Army R&D Program

- A Versatile Smart Submunition for Counter Battery, Anti-Armor Missions
- No Maintenance Required
- High Electronics Content
- Explosively Formed Penetrator Defeats All Known Armored Targets
- Multiple Sensors, Fire & Forget, Top Attack
  - Countermeasure Resistant

Free Economic Good to USN

The World's First Smart Submunition for 155mm



*Naval Surface Fire Support*

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# Vision - Naval Surface Fire Support

